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AUTHOR	Alkin, Marvin C.
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ABSTRACT

This publication is a collection of two hundred sixty-five objectives and evaluation items for mathematics grades seven through nine. The objectives and measurement items were developed by the Instructional Objectives Exchange (IOX) staff and formulated from curricular material submitted by teachers, schools, and school districts. At present, these materials have not been used in the classroom nor have they been subjected to quality control procedures. Both the behavior aspect and the content of each objective have been selected so that the student is required to learn processes and concepts which are essential to the study of mathematics. Some objectives require the student to do no more than recall knowledge, while others require him to apply his knowledge or analyze problems. Most objectives are accompanied by four sample items which are designed to assess the student's acquisition of the desired behavior. Objectives are arranged according to ascending grade level and are organized into the following categories: sets; numbers; numerals and numeration systems; operations and their properties; measurement; geometry; relations, functions and graphs; probability and statistics; applications and problem solving; and mathematical sentences, order and logic. (FL)

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INSTRUCTIONAL OBJECTIVES EXCHANGE

Center for the Study of Evaluation

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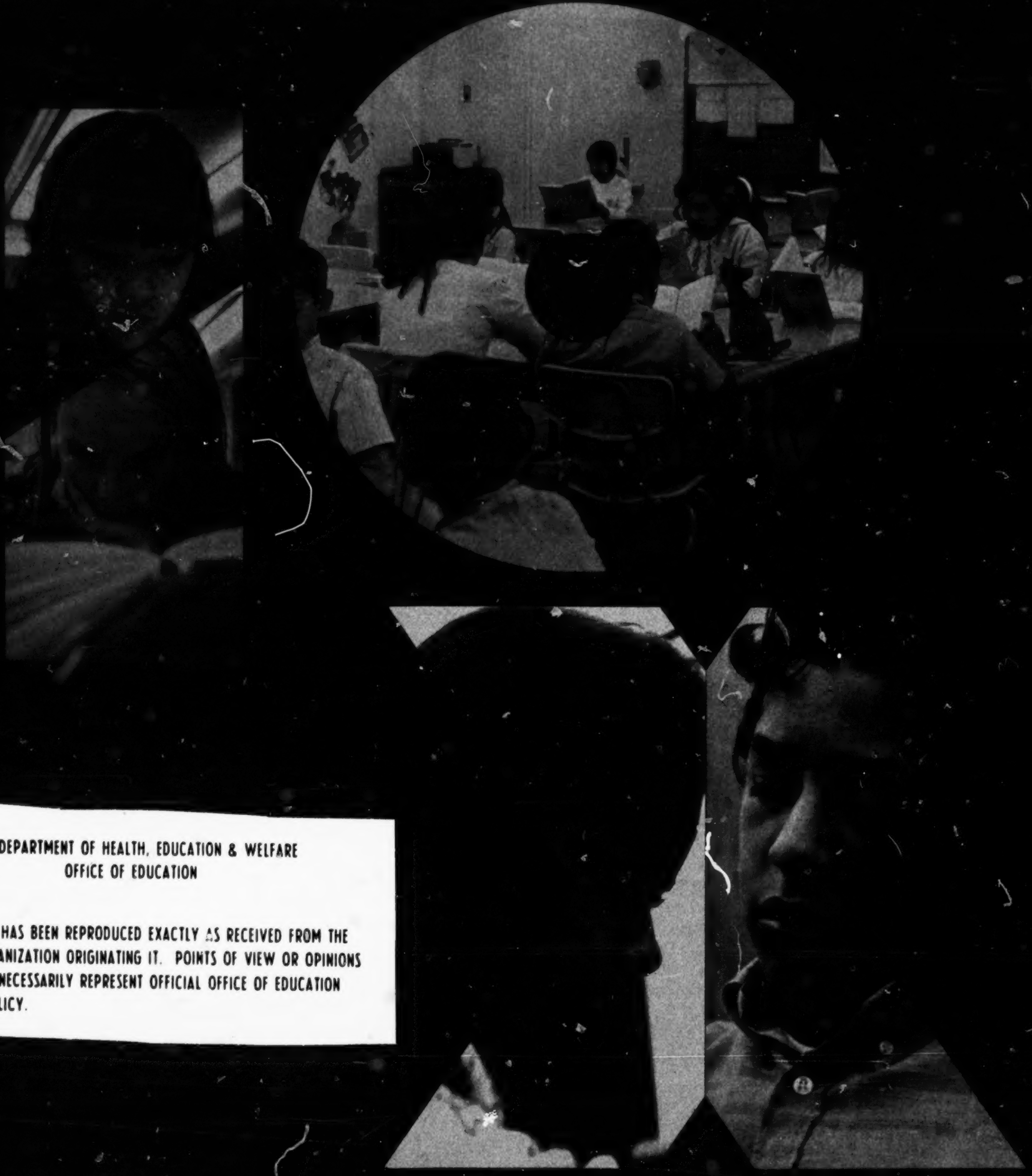

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SE 007 891

MATHEMATICS, 7-9

Marvin C. Alkin
Director

UCLA Graduate School of Education

The CENTER FOR THE STUDY OF EVALUATION (CSE) is one of nine centers for educational research and development, sponsored by the United States Department of Health, Education, and Welfare, Office of Education. Established at UCLA in June, 1966, CSE is devoted exclusively to finding new theories and methods of analyzing educational systems and programs and gauging their effects.

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INSTRUCTIONAL OBJECTIVES EXCHANGE
a project of
THE CENTER FOR THE STUDY OF EVALUATION

MATHEMATICS 7-9

Marvin C. Alkin
Eva L. Baker
Madeline Hunter
Ronald G. McIntire
W. James Popham
Rodney W. Skager

INTRODUCTION

Objective Collections distributed by the Instructional Objectives Exchange (IOX) contain objectives and measurement items developed under the auspices of IOX. These objectives were based either upon curricular material submitted to the Exchange by teachers, schools, and school districts, or they were generated by the IOX staff.

Purpose

The staff of the Exchange believes that it will be easier for the busy teacher or administrator to select from among objectives, and to generate only a very few, than it would be for him to formulate an entire set of behavioral objectives and measurement items.

There is no attempt to dictate curriculum through this service. Rather, the goal of the Exchange is to expedite the user's selection of his own objectives.

The user may select from among these objectives those which are consistent with his own curricular goals, since, in many cases, there will be more objectives contained within each Collection than an individual teacher or district will wish to use in a particular instructional situation. In addition, he may generate objectives to fill gaps which he perceives to exist within the set of objectives as they have been developed.

Contents

Different Objective Collections will vary as to the number of measures which have been developed to assess the attainment of an objective. In some cases, there is a pool of items (usually six). In others, there is only one sample item per objective. In a very few cases, there are no items at all. Though it is the Exchange's intention to supply a pool of items with which to assess each objective, this goal has not yet been accomplished. As additional items are developed, however, their availability will be made known through the publication of IOX Catalogs.

Differences may be noted in the construction of "correct responses" to specific items developed to assess an objective. In some cases, the Exchange has provided "answers." These serve in instances where a single, correct answer is possible. For example, in mathematics items there often exists only one answer that can be considered correct.

In other cases, the Exchange has included as the "correct response" not a specific "answer," but what are called "criteria for judging the correctness of a response." In these instances, a particular behavior, or process, is being taught. As a group of students apply this process in response to an item, their answers may differ and still be considered correct. However, though there is no single correct response, this does not mean that *any response* is correct. For this reason, criteria are provided by means of which the acceptability of a learner's answer can be judged. The criteria are designed to exemplify the process called for in the objective. An example of this is found in the Collection of English literature objectives, wherein the process of evaluating the tone of a poem may permit different answers which can be judged in terms of both a demonstration of the process called for and internal evidence to be found in the poem itself.

As the Instructional Objectives Exchange continues to develop, it is anticipated that the user will be provided with classifications of objectives in each Collection. For example, many objectives can be classified as to whether they call for learner responses at a higher rather than lower cognitive level. Further, as users supply the Exchange with preference data, the degree of preference per objective reflected by various educational groups can be presented. These and other classification schemes will be forthcoming in future IOX publications.

Grade level recommendations for particular Collections have been supplied by contributors and should be ignored by users who consider other grade or age levels more appropriate for their own situation.

Quality Control

The objectives and items contained in this Collection have been adapted from curricular material contributed to the Exchange and, generally, have not been used in their present form in the classroom. The names of the contributors can be found on the acknowledgements page.

In the future, IOX anticipates that objectives and measures distributed will have been subjected to rigorous quality control procedures, such as the following: the material itself will be evaluated in the classroom; subject matter experts will examine the objectives and items in terms of whether given units include all essential or important aspects of the course under consideration; teachers will assess the unit objectives to determine whether they constitute goals feasible for groups of children in the classroom; teachers will report under what special conditions they believe the material can be most effective. Such information will be collated and made available to users. Furthermore, the objectives and measures will incorporate suggestions and improvements derived from their use.

Feedback

At the present time, however, the material is being distributed without these quality control procedures. The principal reason for this is the Exchange's desire to satisfy immediate needs of classroom teachers. Moreover, there is an additional advantage to this procedure. It will provide the Exchange with information about actual classroom use of this material. To this end, the pages immediately following the introductory material contain a questionnaire, designed to supply the Exchange with information related to the above control procedures. IOX would greatly appreciate your cooperation in this matter. *Please remove the questionnaire pages and return them after you have examined, or, preferably, actually used, the contents of this booklet.*

The Exchange solicits your patience as you examine these early materials so that the system can, in time, be updated and improved. This first effort, albeit primitive, starts the cycle toward a continually improving collection of instructional objectives which, hopefully, can be of considerable utility to the nation's educators.

THE MATHEMATICS COLLECTION

This Collection contains 265 objectives and related evaluation items for math, grades seven through nine. It is organized into the following categories: sets, numbers, numerals and numeration systems; operations and their properties; measurement; geometry; relations, functions and graphs; probability and statistics; applications and problem solving; and mathematical sentences, order and logic. The objectives in each category are arranged in terms of ascending grade level.

Each objective in the Collection contains four elements: (1) the objective, (2) measurement items, (3) means for judging the adequacy of student responses, and (4) an IOX rating.

The objective itself is stated in operational terms, and is identified by a Category and a Sub-Category, which serve to limit and define it. The behavioral aspect as well as the content of the objective have been carefully selected so that the student is required to master processes and concepts which are structural to the discipline of math. The total Collection requires the acquisition of a wide range of behaviors. A few objectives require no more from the student than that he be able to recall knowledge, while other objectives require the student to apply his knowledge, or to analyze or synthesize given problems.

The majority of the objectives are accompanied by four sample items, each of which is designed to test the student's acquisition of the desired behavior. In most cases, a correct answer to the problem has been provided. However, there are instances where a single correct answer is impossible to supply. In these cases, either sets of possible answers or suggested criteria for evaluating the student's answer have been provided.

All objectives included here have been rated by participants of the 1969 IOX Summer Institute for the Preparation of Instructional Objectives. Ratings ranging from 1 (acceptable) to 5 (unacceptable) were given according to whether the objective should be retained in the IOX *Collection*. Objectives rated 4 or 5 were eliminated from the present *Collection*.

Acknowledgements

While the objectives and items contained in this *Collection* have been developed by the Staff of the Instructional Objectives Exchange, much of the material is based upon contributions made by the following school districts:

Clark County School District, Las Vegas, Nevada
Bucks County Public Schools, Doylestown, Pennsylvania
Department of Public Instruction, Harrisburg, Pennsylvania
Cajon Valley Union School District, El Cajon, California
Frederick County Public Schools, Frederick, Maryland
Winnetka Public Schools, Winnetka, Illinois
School City of Gary, Gary, Indiana
John Glenn Jr. High School, San Angelo, Texas

The following individuals added to, refined and rated the material:

Brother Arthur Indelicato
De La Salle High School, Minneapolis, Minnesota

Mrs. Yuriko Abe
Los Angeles City Schools, California

Miss Chizuko Sakuma
Los Angeles City Schools, California

Miss Lois Barth
Long Beach Unified School District, California

Mrs. Sally Cardarelli
Liverpool, New York

Mr. Robert Geurts
Kentfield School District, California

Mrs. Phyllis Thom
Palos Verdes Unified School District, California

Mr. Paul V. Wilcox
Los Alamos Public Schools, New Mexico

The Instructional Objectives Exchange genuinely appreciates the significant contributions of these school districts and individuals.

To the User:

In order to improve the quality of our Collections of objectives and test items, we must have feedback from our users. We anticipate that our Collections will be used by both teachers and administrators, which means they will be utilized in various ways. However, some aspects of the objectives and related test items are important regardless of the user's intent, and we would like to evaluate this Collection with respect to those dimensions. With this in mind, we ask that you take a few minutes to complete and return the following questionnaire.

Part I of the questionnaire requests information which identifies the user's interest in the Collection. This is important and should be completed by everyone. Parts II and III relate to the objectives and test items, respectively, and should also be completed by all users. Part IV goes into greater detail than the preceding parts, and is optional.

We strongly urge that you look at the questionnaire *now* so that you may jot down pertinent comments while you are using the Collection. Then complete the questionnaire and return it as soon as possible after use of the Collection. Your cooperation in this matter is extremely valuable and is greatly appreciated.

INSTRUCTIONAL OBJECTIVES EXCHANGE USER QUESTIONNAIRE

Part I: USER information--Please complete the following:

1. Title and Number of Collection: ____________________

2. Name: ____________________ Position: ____________________

3. School: ____________________

4. School District: ____________________

5. City: ____________________ State ____________ Zip ____________

6. Grade level(s) of class(es) using the Collection: ____________________

7. Please check the ability level(s) of the class(es) using the Collection:

   ☐ below average ☐ average ☐ above average

Part II: INSTRUCTIONAL OBJECTIVES Information--Please check or fill in where appropriate:

1. a. Overall, to what extent are the objectives useful to you?

   ☐ not useful ☐ somewhat useful ☐ highly useful

   b. In what way? ____________________

   ____

2. a. Overall, to what extent are the objectives too specific or too general?

   ☐ too specific ☐ just about right ☐ too general

   b. Can you give examples (by objective number) of objectives which are:

   (1) too specific? ____________________

   (2) too general? ____________________

3. a. Overall, to what extent did your students find the objectives difficult?

   ☐ too easy ☐ just about right ☐ too difficult

   b. Can you give examples (by objective number) of objectives which are:

   (1) too easy? ____________________

   (2) too difficult? ____________________

(OVER)

Part III: TEST ITEM Information--Please check or fill in where appropriate:

1. a. Overall, to what extent do the test items measure the objectives?

   not well   somewhat   very well

   b. Can you give examples (by objective and item number) of test items which do not measure the objective?____________________

2. a. Overall, did your students have difficulty reading test items?

   yes   no

   b. Can you give examples (by objective and item number) of items which are difficult to read?____________________

3. a. Overall, how helpful are the 'criteria' provided for evaluating answers to items?

   not helpful   somewhat helpful   very helpful

   b. Can you identify factors to make the criteria more useful?

   ____

   ____

   ____

4. Do you have any additional suggestions with respect to this particular Collection or the general operation of the Instructional Objectives Exchange?

On the following page you will find additional, more explicit questions. If you have time to answer them, your contribution to the improvement of IOX will be greatly increased.

Please mail the completed questionnaire and as much additional information as your time permits to:

QUESTIONNAIRE
INSTRUCTIONAL OBJECTIVES EXCHANGE
Center for the Study of Evaluation
UCLA Graduate School of Education
Los Angeles, California 90024

Part IV: ADDITIONAL Questionnaire Information

These questions require more time to answer than those on the previous page. They are extremely important, however, and any time you can spare to respond to them will be greatly appreciated. Please return this page with the completed questionnaire.

Thank you for your time and effort.

Name:____

School:______________________________________

1. Please list by objective number in the space below all the objectives you actually used.

2. Are there any objectives which should be deleted from the Collection? If so, please list them by objective number and state why they should be removed.

(OVER)

3. Please list by objective and item number any test items which do not accurately measure their objectives or which are otherwise in error. If possible, briefly describe the error.

4. Please describe any important objectives or concepts which do not appear in the Collection. Use an additional sheet of paper if necessary.

Please mail the completed questionnaire and as much additional information as your time permits to:

QUESTIONNAIRE
INSTRUCTIONAL OBJECTIVES EXCHANGE
Center for the Study of Evaluation
UCLA Graduate School of Education
Los Angeles, California 90024

Objective 1 Math

IOX Acceptability Rating: 1 Grade 7

MAJOR CATEGORY: Sets

SUB-CATEGORY: Subsets

OBJECTIVE: Given a set of objects in the classroom, the student will identify at least three subsets of the set.

SAMPLE ITEM: From the set of chalkboard drawing instruments in your classroom, list at least 3 subsets of the set.

Answer: Set of chalkboard drawing instruments

{Protractor, Compass, Straightedge}

Possible Answers:

{Protractor} {Compass} {Straightedge}

{Protractor, Compass}

{Protractor, Straightedge}

{Compass, Straightedge}

{Protractor, Compass, Straightedge}

{ } or $\emptyset$

ITEM 1

Objective 2 | Math
IOX Acceptability Rating: 1 | Grade 7

MAJOR CATEGORY: Sets

SUB-CATEGORY: Subsets

OBJECTIVE: Given a set of N members, the student will list all possible proper subsets and the improper subsets.

SAMPLE ITEM: List all proper subsets of {1, 2, 3} on the left and the improper subset on the right.

Answer:

Proper Subset	Improper Subset
{1}	{1, 2, 3}
{2}	
{3}	
{1, 2}	
{1, 3}	
{2, 3}	

ITEM 1

Objective 3

IOX Acceptability Rating: 1

Math

Grade 7

MAJOR CATEGORY: Sets

SUB-CATEGORY: Set Symbols

OBJECTIVE: Given a series of symbols relating to sets and a list of their respective definitions, the student will identify by matching the correct definition to its correct symbol.

SAMPLE ITEM: Place the letter of the correct definition in the space provided:

_____ $\neq$
_____ $\in$
_____ $\{\ \}$
_____ $\notin$
_____ $\subset$
_____ $\not\subset$
_____ $\emptyset$
_____ $\cap$
_____ U

A. Is a member of
B. Is a subset of
C. Intersection
D. Union
E. Set
F. Angle
G. Is not a subset of
H. Not equal to
I. Is greater than
J. Equal to
K. Empty or null set
L. Is not a member of

Answer: H, A, E, L, B, G,
K, C, D

ITEM 1

Objective 4

IOX Acceptability Rating: 1

Math

Grade 7

MAJOR CATEGORY: Sets

SUB-CATEGORY: Comparing Sets

OBJECTIVE: Given a set, the student will state whether it is finite or infinite.

SAMPLE ITEMS:

Is the following set finite or infinite?

Students in your math class

Answer: Finite

ITEM 1

Is the following set finite or infinite?

Set of eggs in a dozen

Answer: Finite

ITEM 2

Is the following set finite or infinite?

Set of all natural numbers

Answer: Infinite

ITEM 3

Is the following set finite or infinite?

Set of prime numbers < 12

Answer: Finite

ITEM 4

Objective 5

Math

IOX Acceptability Rating: 1

Grade 7

MAJOR CATEGORY: Sets

SUB-CATEGORY: Operations on Sets

OBJECTIVE: Given N sets, the student will match given statements of union and intersection with a correct given Venn diagram.

SAMPLE ITEM: Let A = {1, 3, 5} , B = {2, 4, 3},

C = {0, 6}, D = {3, 9}

Match the left column with the appropriate diagram in the right column.

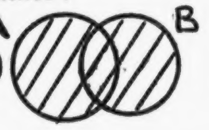
_____ A) A U B

_____ B) A B

_____ C) A U C

_____ D) B C

_____ E) A B C

1)


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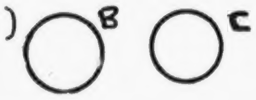

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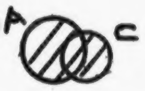

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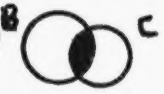

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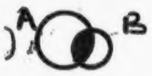

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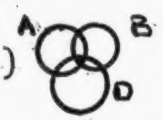

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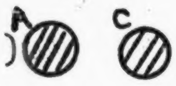


Answer: 2 A) 7 C) 6 E)

5 B) 2 D)

ITEM 1

Objective 6

IOX Acceptability Rating: 1

Math

Grade 7 - 9

MAJOR CATEGORY: Sets

SUB-CATEGORY: Subsets

OBJECTIVE: Given sets of natural numbers, whole numbers and rational numbers, the student will order them by means of a Venn diagram and subset notation.

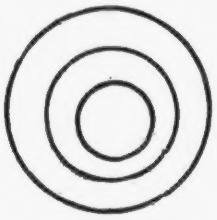
SAMPLE ITEM: Given the sets:

A = {1, 3}

B = {1, 3, 5}

C = {1, 3, 5, 7}

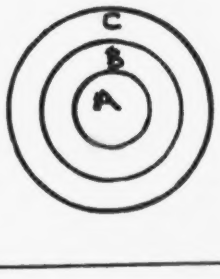
1. Label the Venn diagram with A, B, C.



2. Order the sets with respect to subset notation.

Answer:

1.



2.

A C B C C

ITEM 1

Objective 7 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Sets

SUB-CATEGORY: Equal Sets, Equivalent Sets, and One-to-One Correspondence of Sets

OBJECTIVE: Given pairs of sets, the student will identify those sets which are equal and those which are equivalent.

SAMPLE ITEMS:

Indicate if the following set is (A) equal, (B) equivalent or (C) in one-to-one correspondence by listing the letter in the .

{a, e, i, o, u} and
{e, u, a, o, i}

Answer:

A
B
C

ITEM 1

Indicate if the following set is (A) equal, (B) equivalent or (C) in one-to-one correspondence by listing the letter in the .

{John, Henry, Mary, Bill} and
{Henry, Bill, John, Eddie}

Answer:

A
B
C

ITEM 2

Indicate if the following set is (A) equal, (B) equivalent or (C) in one-to-one correspondence by listing the letter in the .

{2, 4, 6, 8, 10} and
{1, 3, 5, 7, 9}

Answer:

A
B
C

ITEM 3

Indicate if the following set is (A) equal, (B) equivalent or (C) in one-to-one correspondence by listing the letter in the .

{1, 5, 7, 9} and the set of positive even numbers less than 10

Answer:

A
B
C

ITEM 4

Objective 8

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Sets

SUB-CATEGORY: Sets and Their Members: Whole Number, Natural Number, and Odd Number

OBJECTIVE: Given a list of numbers from 1 - 45, the student will specify in set notation the sets of whole numbers, natural numbers, and odd numbers.

SAMPLE ITEMS:

Specify in set notation the set of whole numbers from 1 - 10.

Answer: {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}

ITEM 1

Specify in set notation the set of odd numbers from 1 - 21.

Answer: {1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21}

ITEM 2

Specify in set notation the set of natural numbers from 1 - 21.

Answer: {2, 4, 6, 8, 10, 12, 14, 16, 18, 20}

ITEM 3

Specify in set notation the set of whole numbers from 0 - 1.

Answer: { }

ITEM 4

Objective 9

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Sets

SUB-CATEGORY: Sets and Their Members: Prime and Composite Numbers

OBJECTIVE: Given a specific replacement set, the student will specify in set notation the sets of whole numbers, natural numbers, odd numbers, prime numbers and composite numbers.

SAMPLE ITEMS:

Given the replacement set of natural numbers between 0 and 45, specify the following in set notation.

The set of prime numbers less than 20

Answer:

{2, 3, 5, 7, 11, 13, 17, 19}

ITEM 1

Given the replacement set of natural numbers between 0 and 45, specify the following in set notation.

The set of composite numbers from 21 to 30

Answer:

{21, 22, 24, 25, 26, 27, 28, 30}

ITEM 2

Given the replacement set of natural numbers between 0 and 45, specify the following in set notation.

The set of whole numbers

Answer:

{0, 1, 2, ...45}

ITEM 3

Given the replacement set of natural numbers between 0 and 45, specify the following in set notation.

The set of natural numbers

Answer:

{1, 2, 3, ...45}

ITEM 4

Objective 10 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Sets

SUB-CATEGORY: Set-Builder Notation

OBJECTIVE: Given a set, the student will be able to name the elements, cardinal number, and specify the set by roster.

SAMPLE ITEMS:

Given a set $A = \{\text{natural odd numbers} < 6\}$, use the roster form to list the elements of set A and name the cardinal number.

Answer: $A = \{1, 3, 5\}$
Cardinal number
3

ITEM 1

Given a set $B = \{\text{natural even numbers} < 6\}$, use the roster form to list the elements of set B and name the cardinal number.

Answer: $B = \{2, 4\}$
Cardinal number
2

ITEM 2

Given a set $C = \{\text{natural numbers} < 10\}$, use the roster form to list the elements of set C and name the cardinal number.

Answer: $C = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$
Cardinal number
9

ITEM 3

Given a set $B = \{\text{natural numbers} < 0\}$, use the roster form to list the elements of set D and name the cardinal number.

Answer: $D = \{\ \}$
Cardinal number
0

ITEM 4

Objective 11

IOX Acceptability Rating: 1

Math

Grades 7 - 9

MAJOR CATEGORY: Sets

SUB-CATEGORY: Set-Builder Notation

OBJECTIVE: Given a set specified by set-builder notation, the student will explain the set's meaning.

SAMPLE ITEM: Given $S = \{-2, -2, 0, 1, 2, 3\}$ and

$T = \{-3/2, -1, 1/2, 3\}$

Read the following and explain its meaning:

$\{X : X \in S, X \notin T\}$

Answer: The set of X such that X is an element of S, but X is not an element of set T, that is,

$X \in \{-2, 0, 1, 2\}$

ITEM 1

Objective 12

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Sets

SUB-CATEGORY: Set-Builder Notation

OBJECTIVE: Given a description of a set, the student will specify the set in set-builder notation.

SAMPLE ITEM: Express in set-builder notation the set of numbers in the form of $\frac{A}{B}$ where A represents a whole number and B represents a natural number.

Answer: $\{X : X = \frac{A}{B}, A \quad W, B \quad N\}$

ITEM 1

Objective 13

IOX Acceptability Rating: 1

Math

Grades 7 - 9

MAJOR CATEGORY: Sets

SUB-CATEGORY: Replacement Sets

OBJECTIVE: Given a replacement set and several number sentences with one unknown, the student will give the solution or truth set.

SAMPLE ITEM: Given the replacement set

$$R = \{X \in \text{Integers}; -2 < X < 6\}$$

find the solution or truth set for each of the given equations:

1. $X + 4 = 9$
2. $X + 2 < 13$
3. $10 - 12 = X$

Answers:
1. $X \in \{5\}$
2. $X \in \{-1, 0, 1, 2, 3, 4, 5\}$ or R
3. $X \in \{\ \}$ or $\emptyset$

ITEM 1

Math

Objective 14

Grade 7-9

IOX Acceptability Rating: 1

MAJOR CATEGORY: Numbers, Numerals, Numeration Systems

SUB-CATEGORY: Numerals in Other Place Value Systems

OBJECTIVE: Given a numeral in any base two-twelve, the student will find the corresponding base ten numeral.

SAMPLE ITEMS:

Find the base ten numeral corresponding to the following numeral:

211_{three}

Answer: 22

ITEM 1

Find the base ten numeral corresponding to the following numeral:

3122_{four}

Answer: 218

ITEM 2

Find the base ten numeral corresponding to the following numeral:

321_{five}

Answer: 86

ITEM 3

Find the base ten numeral corresponding to the following numeral:

$T2T_{\text{twelve}}$

Answer: 1474

ITEM 4

Objective 15 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Numbers, Numerals, Numeration Systems

SUB-CATEGORY: Roman Numerals - I, V, X, L, D, M, and the Symbol —

OBJECTIVE: Given a Roman numeral consisting of a combination of symbols, the student will write the corresponding Hindu-Arabic numeral.

SAMPLE ITEMS:

Write the Hindu-Arabic numeral for the following Roman numeral:

DCXL

Answer: 640

ITEM 1

Write the Hindu-Arabic numeral for the following Roman numeral:

XLV

Answer: 45

ITEM 2

Write the Hindu-Arabic numeral for the following Roman numeral:

LXVIII

Answer: 68

ITEM 3

Write the Hindu-Arabic numeral for the following Roman numeral:

CCC

Answer: 300

ITEM 4

Objective 16

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Numbers, Numerals, Numeration Systems

SUB-CATEGORY: Egyptian Numerals

OBJECTIVE: Given a list of ancient Eygptian numerals and their corresponding Hindu-Arabic Numerals, the student will rename given ancient Egyptian numerals in Hindu-Arabic notation.

SAMPLE ITEMS:

Use the following information, name the Egyptian numerals listed below in Hindu-Arabic notation.

1 - 𓏺

10 - 𓎆

100 - 𓍢

1000 - 𓆼

10000 - 𓂭

100,000 - 𓆐

1,000,000 - 𓁨

A. 𓍢𓎆𓎆𓎆

B. 𓂭𓂭𓍢𓍢𓍢𓎆𓎆𓏺𓏺

C. 𓍢𓍢𓍢𓎆

D. 𓂭𓂭𓂭𓏺𓏺𓏺

Answers:
A. 130
B. 20,322
C. 310
D. 30,003

ITEM 1

Objective 17 — Math

IOX Acceptability Rating: 1 — Grade 7-9

MAJOR CATEGORY: Numbers, Numerals, Numeration Systems

SUB-CATEGORY: Naming Parts of Problems - Addend, Sum, Factor, Product, Dividend, Divisor, Quotient, Minuend, Subtrahend, Difference

OBJECTIVE: Given a problem representative of an operation with whole or fractional numerals, the student will supply the name of the indicated part of the problem.

SAMPLE ITEMS:

Name the part of the problem indicated by the arrow:

$$\begin{array}{r} 46 \\ \times\ 7 \\ \hline 322 \end{array} \leftarrow \underline{\qquad\qquad}$$

Answer: Product

ITEM 1

Name the part of the problem indicated by the arrow:

$$42 - 7 = 6 \leftarrow \underline{\qquad\qquad}$$

Answer: Quotient

ITEM 2

Name the part of the problem indicated by the arrow:

$$\begin{array}{r} 56 \\ +64 \\ \hline 120 \end{array} \leftarrow \underline{\qquad\qquad}$$

Answer: Sum

ITEM 3

Name the part of the problem indicated by the arrow:

$$\frac{\frac{5}{6}}{\left.\frac{1}{8}\right\}} \leftarrow \underline{\qquad\qquad}$$

Answer: Divisor

ITEM 4

Objective 18 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Numbers, Numerals, Numeration Systems

SUB-CATEGORY: Decimal Notation

OBJECTIVE: Given a numeral written in expanded notation, the student will name the decimal numeral for the indicated sum.

SAMPLE ITEMS:

Given a numeral written in expanded notation, the student will name the decimal numeral for the indicated sum.

(5x1000) + (6x100) + (0x10) + 7 + (4 x 1/10) + (5 x 1/100) + 6 x 1/1000)

Answer: 5607.456

ITEM 1

Given a numeral written in expanded notation, the student will name the decimal numeral for the indicated sum.

(3x100) + (6x10) + 3 + (4x1/10)

Answer: 363.4

ITEM 2

Given a numeral written in expanded notation, the student will name the decimal numeral for the indicated sum.

(4x1000) + (6x100) + (7x10) + 8 + (3x1/10) + (4x1/100)

Answer: 4678.34

ITEM 3

Given a numeral written in expanded notation, the student will name the decimal numeral for the indicated sum.

(5x10,000) + (3x100) + 4 + (3x1/10) + (4x1/1000)

Answer: 50,304.304

ITEM 4

Objective 19 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Numbers, Numerals, Numeration Systems

SUB-CATEGORY: Decimal Numerals

OBJECTIVE:	Given a decimal numeral of no more than six decimal places, the student will rewrite the numeral in words, with no more than one spelling or punctuation error.

SAMPLE ITEMS:

Write the following decimal numeral in words. 356.2 Answer: three hundred fifty-six and two tenths ITEM 1	Write the following decimal numeral in words. 76.324 Answer: seventy-six and three hundred twenty-four thousandths ITEM 2
Write the following decimal numeral in words. 5.72 Answer: five and seventy-two hundredths ITEM 3	Write the following decimal numerals in words. 4.6 Answer: four and six tenths ITEM 4

Objective 20
IOX Acceptability Rating: 1

Math
Grade 7-9

MAJOR CATEGORY: Numbers, Numerals, Numeration Systems

SUB-CATEGORY: Terminating and Repeating Decimals

OBJECTIVE: Given a terminating or repeating decimal of no more than 6 decimal places, the student will name the indicated approximation for the given number.

SAMPLE ITEMS:

Name the indicated approximation for the given number. 0.140625 (nearest hundredth) Answer: 0.14 ITEM 1	Name the indicated approximation for the given number. 2.31478 (nearest thousandth) Answer: 2.315 ITEM 2
Name the indicated approximation for the given number. $0.31\overline{7}$ (nearest hundredth) Answer: 0.32 ITEM 3	Name the indicated approximation for the given number. $18.\overline{37}$ (nearest ten-thousandth) Answer: 18.3778 ITEM 4

Objective 21

Math

IOX Acceptability Rating: 1

Grade 7-9

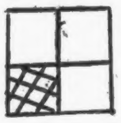
MAJOR CATEGORY: Numbers, Numerals, Numeration Systems

SUB-CATEGORY: Rational Numbers - Models

OBJECTIVE: Given a shaded model representing a fraction, the student will express shaded portion in fractional form.

SAMPLE ITEMS:

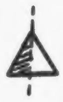
Express in fractional form the shaded area.



Answer: $\frac{1}{4}$

ITEM 1

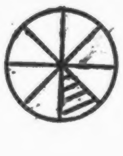
Express in fractional form the shaded area.



Answer: $\frac{1}{2}$

ITEM 2

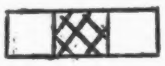
Express in fractional form the shaded area



Answer: $\frac{1}{8}$

ITEM 3

Express in fractional form the shaded area.



Answer: $\frac{1}{3}$

ITEM 4

Objective 22 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Numbers, Numerals, Numeration Systems

SUB-CATEGORY: Equivalent Fractions

OBJECTIVE: Given a fraction, the student will write at least three equivalent fractions.

SAMPLE ITEMS:

Write two equivalent fractions for the following fraction: $\frac{3}{4}$ Answer: $\frac{6}{8}$, $\frac{12}{16}$, ... ITEM 1	Write two equivalent fractions for the following fraction: $\frac{7}{8}$ Answer: $\frac{14}{16}$, $\frac{56}{64}$, ... ITEM 2
Write two equivalent fractions for the following fraction: $\frac{3}{8}$ Answer: $\frac{6}{16}$, $\frac{15}{40}$ ITEM 3	Write two equivalent fractions for the following fraction: $\frac{6}{14}$ Answer: $\frac{3}{7}$, $\frac{12}{28}$ ITEM 4

Math

Grade 7-9

Objective 23

IOX Acceptability Rating: 1

MAJOR CATEGORY: Numbers, Numerals, Numeration Systems

SUB-CATEGORY: Proper, Complex, Improper Fraction and Mixed Numbers

OBJECTIVE: Given a fraction, the student will identify it as being complex, proper, improper or a mixed number.

SAMPLE ITEMS:

Identify the following as proper (P), improper (I), complex (C) or mixed number (M).

$\frac{3}{5}$

Answer: P

ITEM 1

Identify the following as proper (P), improper (I), complex (C) or mixed number (M).

$\frac{8}{8}$

Answer: I

ITEM 2

Identify the following as proper (P), improper (I), complex (C) or mixed number (M).

$\frac{\frac{26}{5}}{\frac{13}{3}}$

Answer: C

ITEM 3

Identify the following as proper (P), improper (I), complex (C) or mixed number (M)

$6\frac{1}{6}$

Answer: M

ITEM 4

Objective 24 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Numbers, Numerals, Numeration Systems

SUB-CATEGORY: Renaming Decimals and Fractions

OBJECTIVE: Given a decimal numeral of no more than 5 places, the student will state in simplest form the common fraction that is equivalent to the given decimal.

SAMPLE ITEMS:

State in simplest form the common fraction that is equivalent to the given decimal numeral:

0.625

Answer: $\frac{5}{8}$

ITEM 1

State in simplest form the common fraction that is equivalent to the given decimal numeral:

0.2

Answer: $\frac{1}{5}$

ITEM 2

State in simplest form the common fraction that is equivalent to the given decimal numeral:

.40

Answer: $\frac{2}{5}$

ITEM 3

State in simplest form the common fraction that is equivalent to the given decimal numeral:

.0002

Answer: $\frac{1}{5000}$

ITEM 4

Objective 25 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Numbers, Numerals, Numeration Systems

SUB-CATEGORY: Renaming Decimals and Fractions

OBJECTIVE: Given a fractional numeral, the student will state the decimal numeral that names the indicated approximation to the given numeral.

SAMPLE ITEMS:

Find the decimal that names the indicated approximation to the given number.

$\frac{7}{6}$ (nearest thousandth)

Answer: 1.167

ITEM 1

Find the decimal that names the indicated approximation to the given number.

$\frac{195}{11}$ (nearest tenth)

Answer: 17.7

ITEM 2

Find the decimal that names the indicated approximation to the given number.

$\frac{4}{9}$ (nearest ten-thousandth)

Answer: 0.4444

ITEM 3

Find the decimal that names the indicated approximation to the given number.

$\frac{1}{7}$ (nearest hundredth)

Answer: 0.14

ITEM 4

Objective 26

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Numbers, Numerals, Numeration Systems

SUB-CATEGORY: Multiplicative Inverse or Reciprocal

OBJECTIVE: Given any mathematical term, the student will give the multiplicative inverse on reciprocal of that term.

SAMPLE ITEMS:

Write the multiplicative inverse or reciprocal for the following: 4 Answer: $\frac{1}{4}$ ITEM 1	Write the multiplicative inverse or reciprocal for the following: $\frac{3}{2}$ Answer: $\frac{2}{3}$ ITEM 2
Write the multiplicative inverse or reciprocal for the following: $2\frac{1}{2}$ Answer: $\frac{2}{5}$ ITEM 3	Write the multiplicative inverse or reciprocal for the following: AB Answer: $\frac{1}{AB}$ ITEM 4

Objective 27

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Numbers, Numerals, Numeration Systems

SUB-CATEGORY: Least Common Multiple

OBJECTIVE: Given a set of no more than 6 numbers of less than three digits, the student will name the least common multiple of each set.

SAMPLE ITEMS:

Name the least common multiple in the following set:

3, 4

Answer: 12

ITEM 1

Name the least common multiple in the following set:

15, 25

Answer: 75

ITEM 2

Name the least common multiple in the following set:

2, 3, 10

Answer: 30

ITEM 3

Name the least common multiple in the following set:

4, 7, 12, 42, 2, 14

Answer: 84

ITEM 4

Objective 28

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Numbers, Numerals and Numeration Systems

SUB-CATEGORY: Greatest Common Factor

OBJECTIVE: Given a set of 2 or 3 numerals of less than three digits, the student will name the greatest common factor of each set.

SAMPLE ITEMS:

Name the greatest common factor in the following:

12, 30

Answer: 6

ITEM 1

Name the greatest common factor in the following:

8, 20

Answer: 4

ITEM 2

Name the greatest common factor in the following:

24, 36, 48

Answer: 12

ITEM 3

Name the greatest common factor in the following:

56, 14

Answer: 14

ITEM 4

Objective 29 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Number, Numeral, Numeration Systems

SUB-CATEGORY: Proper Factors

OBJECTIVE: Given any number, the student will tell the proper factors of that number, if there are any.

SAMPLE ITEMS:

List the proper factors, if any, of the following number. If there are no proper factors, write the word "none".

52

Answer: 2, 4, 13, 26

ITEM 1

List the proper factors, if any, of the following number. If there are no proper factors, write the word "none".

33

Answer: 3, 11

ITEM 2

List the proper factors, if any, of the following number. If there are no proper factors, write the word "none".

17

Answer: none

ITEM 3

List the proper factors, if any, of the following number. If there are no proper factors, write the word "none".

111

Answer: 3, 37

ITEM 4

Objective 30 — Math

IOX Acceptability Rating: 1 — Grade 7-9

MAJOR CATEGORY: Numbers, Numerals, Numerations Systems

SUB-CATEGORY: Prime Factoring

OBJECTIVE: Given a composite base ten number of less than four places, the student will express the number in prime factored form.

SAMPLE ITEMS:

Write the following composite number in prime factored form.

84

Answer: $84 = 7 \cdot 3 \cdot 2 \cdot 2$ or

$2^2 \cdot 3 \cdot 7$

ITEM 1

Write the following composite number in prime factored form.

105

Answer: $105 = 3 \cdot 5 \cdot 7$

ITEM 2

Write the following composite number in prime factored form.

81

Answer: $81 = 3 \cdot 3 \cdot 3 \cdot 3$ or

3^4

ITEM 3

Write the following composite number in prime factored form.

56

Answer: $56 = 2 \cdot 2 \cdot 2 \cdot 7$ or

$2^3 \cdot 7$

ITEM 4

Objective 31 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Numbers, Numerals, Numeration Systems

SUB-CATEGORY: Scientific Notation

OBJECTIVE: Given a base ten numeral of no more than eight places, the student will rename the numeral using scientific notation.

SAMPLE ITEMS:

Rename using scientific notation. 41,800,000 (diameter of earth in feet) Answer: 4.18×10^7 ITEM 1	Rename using scientific notation. 300,000 (weight of a whale in pounds) Answer: 3×10^5 ITEM 2
Rename using scientific notation. 66,600 (speed of earth in orbit around sun in miles per hour) Answer: $6{\cdot}66 \times 10^4$ ITEM 3	Rename using scientific notation. 1,200,000 Answer: 1.2×10^6 ITEM 4

Objective 32 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Numbers, Numerals, Numeration Systems

SUB-CATEGORY: Exponents and Powers

OBJECTIVE: Given a natural number in any base, two through twelve, the student will write the number in expanded notation, exponential notation, or power notation, and numeration.

SAMPLE ITEMS:

Write the following in expanded notation, exponential notation, and power notation.

2476_{eight}

Answer: $(2\text{x}8^3) + (4\text{x}8^2) + (7\text{x}8^1) + (6\text{x}8^0)$

$(2\text{x}512) + (4\text{x}64) + (7\text{x}8) + (6\text{x}1)$

1024 + 256 + 56 + 6

ITEM 1

Write the following in expanded notation, exponential notation, and power notation.

563,501

Answer: $(5\text{x}10^5) + (6\text{x}10^4) + (3\text{x}10^3) + (5\text{x}10^2) + (0\text{x}10^1) + (1\text{x}10^0)$

(5x100,000)+(6x10,000)+(3x1000)+(5x100)+(0x10)+(1x1)

500,000 + 60,000 + 3000 + 500 + 00 + 1

ITEM 2

Objective 33 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Numbers, Numerals, Numeration Systems

SUB-CATEGORY: Scientific Notation

OBJECTIVE: Given decimal numerals or expressions involving powers, the student will simplify where possible and express the result in scientific notation.

SAMPLE ITEMS:

Simplify where possible and express the following in scientific notation: $3 \times 10^5 \times 10^2$ Answer: 3×10^7 ITEM 1	Simplify where possible and express the following in scientific notation: $\frac{36 \times 10^2}{16 \times 10}$ Answer: 2.25×10 ITEM 2
Simplify where possible and express the following in scientific notation: .00098 Answer: 9.8×10^{-4} ITEM 3	Simplify where possible and express the following in scientific notation: 40,700 Answer: 4.07×10^4 ITEM 4

Objective 34

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Numbers, Numerals, Numeration Systems

SUB-CATEGORY: Integers, Positive and Negative

OBJECTIVE: Given a number line and a series of social situations representative of uses of positive and negative integers, the student will indicate the numerical value of the situation on a number line.

SAMPLE ITEM:

Indicate the following on the number line by placing the letter of each situation above the appropriate position on the given number line.

```
       A     C  D                       B           E
-9 -8 -7 -6 -5 -4 -3 -2 -1 -0  1  2  3  4  5  6  7  8  9
```

A. 7 feet below sea level

B. A surplus of $4

C. A five yard loss in football

D. A temperature of 4 degrees below zero

E. An increase of $8 in weekly earnings

Answers: Indicated on the number line.

ITEM 1

Objective 35

Math

IOX Acceptability Rating: 1

Grade 7-9

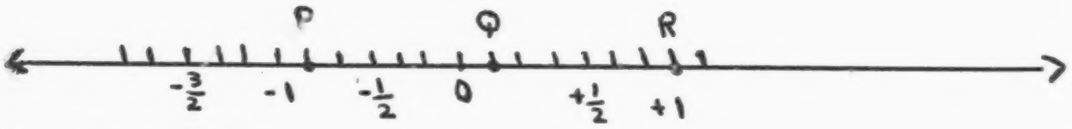
MAJOR CATEGORY: Numbers, Numerals, Numeration Systems

SUB-CATEGORY: Graphs and Coordinates

OBJECTIVE: Given a graph of a rational number line, the student will name the coordinate of a given point and graph a given coordinate.

SAMPLE ITEMS:

Using the given graph, name the coordinate of each of the following points.


P
Q
R
$-\frac{3}{2}$
-1
$-\frac{1}{2}$
0
$+\frac{1}{2}$
+1

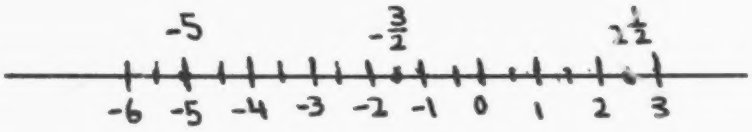
Answer: A. P - ⁻5/6
B. Q - 1/6
C. R - 1

ITEM 1

Graph the following coordinates on a number line:

A. -5
B. -3/2
C. 2 1/2

Answer:


-5
$-\frac{3}{2}$
$2\frac{1}{2}$
-6
-5
-4
-3
-2
-1
0
1
2
3

ITEM 2

Objective 36

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Numbers, Numerals and Numeration Systems

SUB-CATEGORY: Evaluation of Expressions Involving Powers

OBJECTIVE: Given an expression involving powers, the student will simplify the expression where possible and express the result as a decimal numeral.

SAMPLE ITEMS:

Simplify the following if possible and express the result as a decimal numeral: $10^5 - 10^4$ Answer: 90,000 ITEM 1	Simplify the following if possible and express the result as a decimal numeral. $10^5 \times 5 \times 5^0$ Answer: 500,000 ITEM 2
Simplify the following if possible and express the result as a decimal numeral: $3 \times \frac{1}{10^2}$ Answer: .03 ITEM 3	Simplify the following if possible and express the result as a decimal numeral. $10^{-5} \times 6$ Answer: .00006 ITEM 4

Objective 37

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Numbers, Numerals, Numeration Systems

SUB-CATEGORY: Absolute Value

OBJECTIVE: Given any expression written in absolute value form, the student will express the equivalent value without the absolute value symbol.

SAMPLE ITEMS:

Rewrite the following as an equivalent value without the absolute value symbol.

$$|8|$$

Answer: 8

ITEM 1

Rewrite the following as an equivalent value without the absolute value symbol.

$$|-2|$$

Answer: 2

ITEM 2

Rewrite the following as an equivalent value without the absolute value symbol.

$$|8| - |-2|$$

Answer: 8 - 2

ITEM 3

Rewrite the following as an equivalent value without the absolute value symbol.

$$|8| + |-2|$$

Answer: 8 + 2

ITEM 4

Objective 38 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Numbers, Numerals, Numeration Systems

SUB-CATEGORY: Additive Inverses or Opposites

OBJECTIVE: Given any signed or directed number, the student will give the additive inverse of that number.

SAMPLE ITEMS:

List the additive inverse for the following. 5 Answer: -5 ITEM 1	List the additive inverse for the following. $-2\frac{1}{2}$ Answer: $2\frac{1}{2}$ ITEM 2
List the additive inverse for the following. $-\frac{3}{4}$ Answer: $\frac{3}{4}$ ITEM 3	List the additive inverse for the following. a Answer: -a ITEM 4

Objective 39 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Numbers, Numerals, Numeration Systems

SUB-CATEGORY: Constants

OBJECTIVE: Given any expression of one or more terms, the student will identify those symbols which will be constant or unchanging in value no matter how they are used in the expression.

SAMPLE ITEMS:

Name the constant in the following expression:

2A

Answer: 2

ITEM 1

Name the constant in the following expression:

πR^2

Answer: π

ITEM 2

Name the constant in the following expression:

x + 3

Answer: 3

ITEM 3

Name the constant in the following expression:

5 - Y

Answer: 5

ITEM 4

Objective 40
IOX Acceptability Rating: 1

Math
Grade 7-9

MAJOR CATEGORY: Numbers, Numerals, Numeration Systems

SUB-CATEGORY: Identity

OBJECTIVE: Given any equation, the student will identify the equation as being expressed in the form of an identity or not in that form.

SAMPLE ITEMS:

Underline each identity you find in the equation: $3x + 2 = 2 + 3x$ Answer: $\underline{3x + 2 = 2 + 3x}$ ITEM 1	Underline each identity you find in the equation: $n + 2n + 3n$ Answer: $\underline{n + 2n = 3n}$ ITEM 2
Underline each identity you find in the equation: $y + 12 = y$ Answer: $y + 12 = y$ ITEM 3	Underline each identity you find in the equation: $5 + x + 5x$ Answer: $5 + x = 5x$ ITEM 4

Objective 41

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Numbers, Numerals, Numeration Systems

SUB-CATEGORY: Irrational Numbers

OBJECTIVE: Given a set of mathematical expressions, the student will identify those which symbolize irrational numbers.

SAMPLE ITEMS:

Tell whether the expression given is rational or irrational.

$\frac{2}{3}$

Answer: rational

ITEM 1

Tell whether the expression given is rational or irrational.

$\frac{\sqrt{3}}{2}$

Answer: irrational

ITEM 2

Tell whether the expression given is rational or irrational.

-5

Answer: rational

ITEM 3

Tell whether the expression given is rational or irrational.

$\frac{\pi}{3}$

Answer: irrational

ITEM 4

Objective 42
IOX Acceptability Rating: 1

Math
Grade 7-9

MAJOR CATEGORY: Operations and Their Properties

SUB-CATEGORY: Addition and Subtraction

OBJECTIVE: Given a problem involving addition and subtraction of whole numbers, the student will perform the indicated operation.

SAMPLE ITEMS:

Perform the operation as the sign indicates.

$$\begin{array}{r} 567 \\ +\ 984 \\ \hline \end{array}$$

Answer: 1551

ITEM 1

Perform the operation as the sign indicates.

$$\begin{array}{r} 340{,}091 \\ 764{,}832 \\ +\ 916{,}111 \\ \hline \end{array}$$

Answer: 2,021,034

ITEM 2

Perform the operation as the sign indicates.

$$\begin{array}{r} 4000 \\ -\ \ 396 \\ \hline \end{array}$$

Answer: 3,604

ITEM 3

Perform the operation as the sign indicates.

$$\begin{array}{r} 590 \\ -\ 342 \\ \hline \end{array}$$

Answer: 248

ITEM 4

Objective 43

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Operations and Their Properties

SUB-CATEGORY: Applications of Whole Number Operations

OBJECTIVE: Given a verbally stated problem involving operations with whole numbers, the student will write a numerical expression that fits the problem and then simplify the expression.

SAMPLE ITEMS:

Write a numerical expression that fits the problem given and simplify the expression.

It takes a chemist 3 hours to prepare a sample for analysis and 2 hours to analyze the sample. How long would it take to make 25 such tests?

Answer: (3 + 2) x 25 = N   N = 125 hours

ITEM 1

Write a numerical expression that fits the problem given and simplify the expression.

A certain TV commercial is shown on one channel 21 times each day and 16 times each night. How many times is the commercial shown in one week?

Answer: (16 + 21) x 7 = N   N = 259 times per week

ITEM 2

Write a numerical expression that fits the problem given and simplify the expression.

Judy offered to sell 25 tickets to the school dance. How many tickets had she sold when she had 19 tickets left?

Answer: 25 - y = 19 or 25 - 19 = y   y = 6

ITEM 3

Objective 44 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Operations and Their Properties

SUB-CATEGORY: Associative Property

OBJECTIVE: Given the indicated sum of any three numerals, the student will use the associative property to arrange them in at least two ways to add the three numbers.

SAMPLE ITEMS:

Using the associative property group the following numbers in two different ways. 7 + 9 + 5 Answer: 7 + (9 + 5) (7 + 9) + 5 ITEM 1	Using the associative property group the following numbers in two different ways. 2 + 4 + 8 Answer: (2 + 4) + 8 2 + (4 + 8) ITEM 2
Using the associative property group the following numbers in two different ways. 7 + 9 + 1 Answer: (7 + 9) + 1 7 + (9 + 1) ITEM 3	Using the associative property group the following numbers in two different ways. 24 + 15 + 17 Answer: (24 + 15) + 17 24 + (15 + 17) ITEM 4

Objective 45

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Operations and Their Properties

SUB-CATEGORY: Number Properties

OBJECTIVE: Given a list of properties of whole numbers and sentences involving operations with whole numbers, the student will match the sentence with the property which is the rationale for the expression.

SAMPLE ITEM:

Place the letter of the correct property in the space provided.

____ 1. A + B = B + A
____ 2. (11 x 7) + (11 x 3) = 11(7 + 3)
____ 3. 1 x 3 = 3
____ 4. 6 x 9 = 9 x 6
____ 5. A + 0 = A
____ 6. 6 x (7 x 3) = (6 x 7) x 3
____ 7. A - 0 = A
____ 8. A x 1 = A
____ 9. 14(2 + 10) = 14(2) + 14(10)
____10. (10 + 7) + 2 = 10 + (7 + 2)

A. Associative Property For Addition
B. Commutative Property For Multiplication
C. Distributative Property
D. Identity For Multiplication
E. Associative Property For Multiplication
F. Identity For Addition
G. Commutative Property For Addition
H. Identity For Subtraction

Answer:
1. G
2. C
3. D
4. B
5. F
6. E
7. H
8. D
9. C
10. A

ITEM 1

Objective 46 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Operations and Their Properties

SUB-CATEGORY: Multiplication of Natural Numbers and 0

OBJECTIVE: Given a problem with factors of no more than 4 places, the student will find the product and use the commutative property to check his work.

SAMPLE ITEMS:

Find the product below. Use the commutative property to check your work.

$$\begin{array}{r} 24 \\ \underline{\times\ 34} \end{array}$$

Answer:
$$\begin{array}{r} 24 \\ \underline{\times\ 34} \\ 96 \\ \underline{72\ } \\ 816 \end{array} \qquad \begin{array}{r} 34 \\ \underline{\times\ 24} \\ 136 \\ \underline{68\ } \\ 816 \end{array}$$

ITEM 1

Find the product below. Use the commutative property to check your work.

$$\begin{array}{r} 307 \\ \underline{\times\ 41} \end{array}$$

Answer:
$$\begin{array}{r} 307 \\ \underline{\times\ 41} \\ 307 \\ \underline{12280} \\ 12,587 \end{array} \qquad \begin{array}{r} 41 \\ \underline{\times\ 307} \\ 287 \\ \underline{12300} \\ 12,587 \end{array}$$

ITEM 2

Find the product below. Use the commutative property to check your work.

$$\begin{array}{r} 500 \\ \underline{\times\ \ 54} \end{array}$$

Answer:
$$\begin{array}{r} 500 \\ \underline{\times\ 54} \\ 2000 \\ \underline{2500\ } \\ 27,000 \end{array} \qquad \begin{array}{r} 54 \\ \underline{\times\ 500} \\ 27,000 \end{array}$$

ITEM 3

Find the product below. Use the commutative property to check your work.

$$\begin{array}{r} 16 \\ \underline{\times\ 17} \end{array}$$

Answer:
$$\begin{array}{r} 16 \\ \underline{\times\ 17} \\ 112 \\ \underline{16\ } \\ 272 \end{array} \qquad \begin{array}{r} 17 \\ \underline{\times\ 16} \\ 102 \\ \underline{17\ } \\ 272 \end{array}$$

ITEM 4

Objective 47 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Operations and Their Properties

SUB-CATEGORY: Division of Natural Numbers

OBJECTIVE: Given 2 natural numbers with a dividend of no more than 4 places, and a divisor of no more than 2 places, the student will perform the division operation using two methods.

SAMPLE ITEMS:

Use two methods to find the quotient. Express your remainder as a fraction in lowest terms.

$7\overline{)252}$

Answer:

```
 7)252              36
   210  30      7)252
    42            21
    42   6         42
        36         42
```

ITEM 1

Use two methods to find the quotient. Express your remainder as a fraction in lowest terms.

$23\overline{)644}$

Answer:

```
 23)644                28
    460  20        23)644
    184               46
    184   8           184
         28           184
```

ITEM 2

Use two methods to find the quotient. Express your remainder as a fraction in lowest terms.

$45\overline{)990}$

Answer:

```
 45)990                22
    900  20        45)990
     90               90
     90   2            90
         22            90
```

ITEM 3

Use two methods to find the quotient. Express your remainder as a fraction in lowest terms.

$4\overline{)363}$

Answer:

```
  4)363                 90 3/4
    360  90          4)363
      3                36
      0   0              3
         90  3/4         0
                         3
```

ITEM 4

Objective 48 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Operations and Their Properties

SUB-CATEGORY: Divisibility Tests For 2, 3, 4, 6, 8, 9

OBJECTIVE: Given a numeral and stated divisibility tests, the student will apply the tests to the numeral.

SAMPLE ITEM:

Number	Test
2	Units digit even number
3	Sum of digits is a multiple of 3
4	Number named by last 2 digits is a multiple of 4
6	Number is a multiple of 2 and 3
8	Number named by last 3 digits is a multiple of 8
9	Sum of digits is a multiple of 9

Apply the stated divisibility test to the given number and write the factors.

231,408

Answer: 2, 3, 4, 6, 8, 9

ITEM 1

Objective 49 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Operations and Their Properties

SUB-CATEGORY: Multiplication Property of Zero

OBJECTIVE: Given a division problem with a divisor of zero, the student will show that the problem has no solution by using repeated subtraction or the inverse relationship.

SAMPLE ITEMS:

By repeated subtraction show there is no solution to this problem. $\frac{15}{0}$ Answer: $0\overline{)15}$ -0 $\overline{15}$ -0 $\overline{15}$... ITEM 1	By repeated subtraction show there is no solution to this problem. $\frac{14}{0}$ Answer: $0\overline{)14}$ -0 $\overline{14}$ -0 $\overline{14}$... ITEM 2
By the inverse relationship show there is no solution to this problem. $\frac{13}{0}$ Answer: $13 \div 0 = 0$ $0 \times 0 = 0$ ITEM 3	By the inverse relationship show there is no solution to this problem. $\frac{2}{0}$ Answer: $2 \div 0 = 0$ $0 \times 0 = 0$ ITEM 4

Objective 50

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Operations and Their Properties

SUB-CATEGORY: Inverse Operations--Multiplication and Division

OBJECTIVE: Given a division statement, the student will express it as a multiplication problem.

SAMPLE ITEMS:

For the following division statement give a multiplication statement.

$30 \div 5 = 6$

Answer: $30 = 5 \times 6$

ITEM 1

For the following division statement give a multiplication statement.

$\frac{N}{3} = 4$

Answer: $N = 4 \times 3$

ITEM 2

For the following division statement give a multiplication statement.

$\frac{A}{B} = C$

Answer: $A = B \times C$

ITEM 3

For the following division statement give a multiplication statement.

$\frac{36}{9} = 4$

Answer: $36 = 9 \times 4$

ITEM 4

Objective 51

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Operations and Their Properties

SUB-CATEGORY: Addition and Subtraction of Decimal Fractions

OBJECTIVE: Given a problem involving addition and/or subtraction of decimal fractions, the student will solve each problem.

SAMPLE ITEMS:

Solve the following problem.

157.1 + 32.138 = _____

Answer: 189.238

ITEM 1

Solve the following problem.

12.309 - 2.6 = _____

Answer: 9.709

ITEM 2

Solve the following problem.

(4.315 + 2.896) - (20.4 - 19.016) = _____

Answer: 5.827

ITEM 3

Solve the following problem.

12.2 gal. - 2.4 gal. + 3.68 gal. = _____

Answer: 13.48 gal.

ITEM 4

Objective 52 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Operations and Their Properties

SUB-CATEGORY: Multiplication of Decimal Fractions

OBJECTIVE: Given a problem involving multiplication of decimal fractions or a combination of addition, subtraction, and multiplication of decimal fractions, the student will solve the problem.

SAMPLE ITEMS:

Solve the following problem.

134.7 x 8 = _____

Answer: 1077.6

ITEM 1

Solve the following problem.

13.7 x .42 = _____

Answer: 5.754

ITEM 2

Solve the following problem.

0.008 x 0.6 = _____

Answer: 0.0048

ITEM 3

Solve the following problem.

(135.7 x 1.1) + (135.7 x 1.08) - (135.7 x 0.67) = _____

Answer: 204.907

ITEM 4

Objective 53

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Operations and Their Properties

SUB-CATEGORY: Division of Decimal Fractions

OBJECTIVE: Given any problem involving division of decimals, the student will select the correct quotient from 4 given choices.

SAMPLE ITEMS:

Select the correct quotient for the following problem.

41.3 ÷ 0.35 = ___ a) 1.18 b) 11.8 c) 118 d) None of these

Answer: c

ITEM 1

Select the correct quotient for the following problem.

$\frac{105.57}{17}$ = ___ a) 6.21 b) 62.1 c) 621 d) None of these

Answer: a

ITEM 2

Select the correct quotient for the following problem.

4.1832 ÷ 8.3 = ___ a) 50.4 b) 5.4 c) .504 d) None of these

Answer: c

ITEM 3

Objective 54 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Operations and Their Properties

SUB-CATEGORY: Expanded Notation of Mixed Fractions and Decimal Fractions

OBJECTIVE: Given a mixed fraction or a decimal fraction, the student will express it in expanded notation using two different forms, one of which uses power notation.

SAMPLE ITEMS:

Write the following in two different forms of expanded notation, one of which uses power notation.

25.004

Answer: $2(10) + 5(1) + 0(\frac{1}{10}) + 0(\frac{1}{100}) + 4(\frac{1}{1000})$

$2(10^1) + 5(10^0) + 0(\frac{1}{10^1}) + 0(\frac{1}{10^2}) + 4(\frac{1}{10^3})$

ITEM 1

Write the following in two different forms of expanded notation, one of which uses power notation.

$17 \frac{5}{10}$

Answer: $1(10) + 7(1) + 5(\frac{1}{10})$

$1(10^1) + 7(10^0) + 5(10^{-1})$

ITEM 2

Write the following in two different forms of expanded notation, one of which uses power notation.

$6 \frac{35}{100}$

Answer: $6(1) + 3(\frac{1}{10}) + 5(\frac{1}{100})$

$6(10^0) + 3(\frac{1}{10}) + 5(\frac{1}{10^2})$

ITEM 3

Objective 55 Math
IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Operations and Their Properties

SUB-CATEGORY: Addition and Subtraction of Fractional Numbers

OBJECTIVE: Given an example involving addition or subtraction of like and unlike fractional numerals, the student will solve and express the answer in simplest form.

SAMPLE ITEMS:

Solve the following problem and express the answer in simplest form. $3\,\frac{2}{5} + 4\,\frac{4}{5} =$ Answer: $3\,\frac{2}{5} + 4\,\frac{4}{5} = 7\,\frac{6}{5} = 8\,\frac{1}{5}$ ITEM 1	Solve the following problem and express the answer in simplest form. $4\,\frac{1}{6} - 3\,\frac{5}{6} =$ Answer: $4\,\frac{1}{6} - 3\,\frac{5}{6} = \frac{2}{6} = \frac{1}{3}$ ITEM 2
Solve the following problem and express the answer in simplest form. $4\,\frac{2}{3} + 3\,\frac{3}{4} =$ Answer: $4\,\frac{2}{3} + 3\,\frac{3}{4} = 7\,\frac{17}{12} = 8\,\frac{5}{12}$ ITEM 3	Solve the following problem and express the answer in simplest form. $5\,\frac{2}{5} - 3\,\frac{3}{4} =$ Answer: $5\,\frac{2}{5} - 3\,\frac{3}{4} = 1\,\frac{13}{20}$ ITEM 4

Objective 56 Math

IOX Acceptability Rating: 1 Grade 7-9

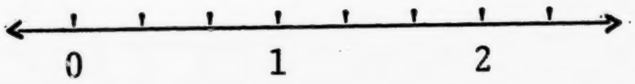
MAJOR CATEGORY: Operations and Their Properties

SUB-CATEGORY: Operations On a Number Line With Fractional Numbers

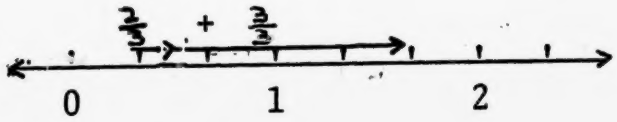
OBJECTIVE: Given a number line, the student will graphically add or subtract like fractions, multiply a fraction by a digit, and express in lowest terms.

SAMPLE ITEMS:

Using the given number line represent the indicated sum, difference, or product and express the answer in lowest terms.



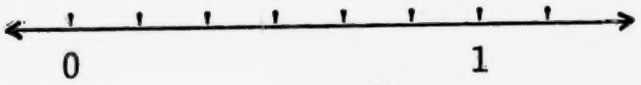
$\frac{2}{3} + \frac{3}{3} =$

Answer: 

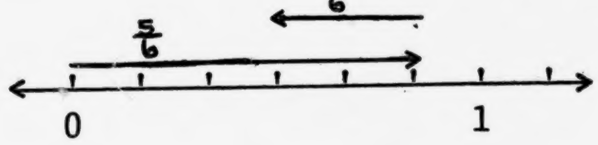
$\frac{2}{3} + \frac{3}{3} = \frac{5}{3}$ or $1\frac{2}{3}$

ITEM 1

Using the given number line represent the indicated sum, difference, or product and express the answer in lowest terms.



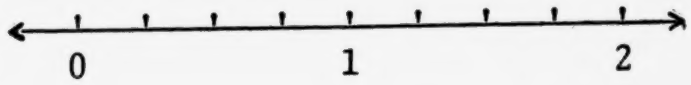
$\frac{5}{6} - \frac{2}{6}$

Answer: 

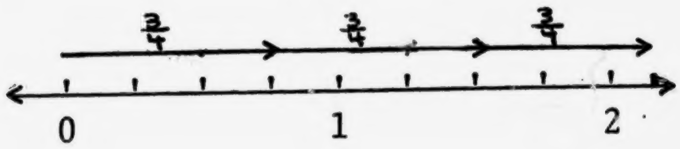
$\frac{5}{6} - \frac{2}{6} = \frac{3}{6}$ or $\frac{1}{2}$

ITEM 2

Using the given number line represent the indicated sum, difference, or product and express the answer in lowest terms.



$3 \times \frac{3}{4} =$

Answer: 

$3 \times \frac{3}{4} = \frac{9}{4}$ or $2\frac{1}{4}$

ITEM 3

Objective 57 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Operations and Their Properties

SUB-CATEGORY: Multiplication of Fractional Numbers

OBJECTIVE: Given an example involving multiplication of fractions, the student will solve and express the answers in simplest form.

SAMPLE ITEMS:

Solve the following problem and express the answers in simplest form.

$$\frac{2}{3} \times \frac{3}{4} =$$

Answer: $\frac{2}{3} \times \frac{3}{4} = \frac{1}{2}$

ITEM 1

Solve the following problem and express the answers in simplest form.

$$3\,\frac{1}{4} \times 2\,\frac{2}{3} =$$

Answer: $3\,\frac{1}{4} \times 2\,\frac{2}{3} = 8\,\frac{2}{3}$

ITEM 2

Solve the following problem and express the answers in simplest form.

$$2\,\frac{1}{4} \times \frac{2}{3} \times \frac{4}{6} =$$

Answer: $2\,\frac{1}{4} \times \frac{2}{3} \times \frac{4}{6} = 1$

ITEM 3

Solve the following problem and express the answers in simplest form.

$$\frac{3}{5} \times 8 =$$

Answer: $\frac{3}{5} \times 8 = 4\,\frac{4}{5}$

ITEM 4

Objective 58 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Operations and Their Properties

SUB-CATEGORY: Division of Fractional Numbers

OBJECTIVE: Given a problem involving division of fractions, the student will divide and express the answer in simplest form.

SAMPLE ITEMS:

Divide the following problem and express the answer in simplest form.

$\frac{3}{4} \div 2 =$ ______

Answer: $\frac{3}{8}$

ITEM 1

Divide the following problem and express the answer in simplest form.

$\frac{3}{8} \div \frac{2}{4} =$ ______

Answer: $\frac{3}{4}$

ITEM 2

Divide the following problem and express the answer in simplest form.

$2\frac{4}{5} \div \frac{2}{3} =$ ______

Answer: $\frac{21}{5}$ or $4\frac{1}{5}$

ITEM 3

Divide the following problem and express the answer in simplest form.

$3\frac{1}{6} \div 4\frac{1}{2} =$ ______

Answer: $\frac{19}{27}$

ITEM 4

Objective 59 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Operations and Their Properties

SUB-CATEGORY: Rational Numbers--Solving Proportions By Use of Equivalent Fractions

OBJECTIVE: Given a proportion having N as a term, the student will solve for N using knowledge of equivalent fractions.

SAMPLE ITEMS:

Solve the following proportion for the value of N.

$$\frac{N}{8} = \frac{0}{4}$$

Answer: 0

ITEM 1

Solve the following proportion for the value of N.

$$\frac{5}{N} = \frac{30}{66}$$

Answer: 11

ITEM 2

Solve the following proportion for the value of N.

$$\frac{18}{36} = \frac{N}{2}$$

Answer: 1

ITEM 3

Solve the following proportion for the value of N.

$$\frac{20}{16} = \frac{5}{N}$$

Answer: 4

ITEM 4

Objective 60

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Operations and Their Properties

SUB-CATEGORY: Properties of Fractional Numbers

OBJECTIVE: Given a list of properties of rational numbers and sentences involving operations with fractions, the student will label each as true or false and match each sentence with the property which is the rationale for the sentence.

SAMPLE ITEM:

Label each of the following sentences as true or false and match each with the property which is the rationale for the sentence.

a. $\frac{1}{5} \times \frac{2}{3} = \frac{2}{3} \times \frac{1}{5}$

b. $\frac{2}{3} \times \frac{3}{3} = \frac{2}{3}$

c. $4(\frac{2}{3} + \frac{3}{5}) = 4(\frac{2}{3}) + \frac{3}{5}$

d. $\frac{1}{5} + (\frac{3}{5} + \frac{2}{3}) = (\frac{3}{5} + \frac{2}{3}) = \frac{1}{5}$

e. $\frac{11}{7} \times \frac{2}{3} \times \frac{7}{11} = 1\frac{2}{3}$

f. $(\frac{4}{5} + \frac{2}{3}) + \frac{3}{5} = \frac{4}{5} + (\frac{2}{3} + \frac{3}{5})$

g. $\frac{3}{5} \times \frac{0}{8} = 0$

h. $3 + (-3) = 0$

A. Associative Property for Addition
B. Commutative Property for Multiplication
C. Distributive Property
D. Identity for Multiplication
E. Associative Property for Multiplication
F. Zero Element
G. Multiplicative Inverse
H. Identity for Addition
I. Commutative Property for Addition
J. Additive Inverse

Answer: a. T, B   e. F, G
b. T, D   f. T, A
c. F, C   g. T, F
d. T, I   h. T, J

ITEM 1

Objective 61 | Math

IOX Acceptability Rating: 1 | Grade 7-9

MAJOR CATEGORY: Operations and Their Properties

SUB-CATEGORY: Addition of Integers

OBJECTIVE: Given an expression requiring the addition operation with integers, the student will simplify the given expression.

SAMPLE ITEMS:

Simplify the following expression.

-8 + 5

Answer: -3

ITEM 1

Simplify the following expression.

(-15) + (-16) + 10 + (-11)

Answer: -32

ITEM 2

Simplify the following expression.

4 + (-4) + 25 + (-25)

Answer: 0

ITEM 3

Simplify the following expression.

31 + (-9)

Answer: 22

ITEM 4

Objective 62 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Operations and Their Properties

SUB-CATEGORY: Subtraction of Integers

OBJECTIVE: Given an expression representative of the subtraction of integers, the student will express each difference as a sum of integers, then name the integer equivalent to the difference.

SAMPLE ITEMS:

Express the following difference as a sum of integers. Then name the integer equal to the difference. 13 - 8 Answer: 13 + (-8) = 5 ITEM 1	Express the following difference as a sum of integers. Then name the integer equal to the difference. 0 - 7 Answer: 0 + (-7) = -7 ITEM 2
Express the following difference as a sum of integers. Then name the difference. 3 - (-9) Answer: 3 + 9 = 12 ITEM 3	Express the following difference as a sum of integers. Then name the difference. 7 - 13 Answer: 7 + (-13) = -6 ITEM 4

Objective 63 — Math

IOX Acceptability Rating: 1 — Grade 7-9

MAJOR CATEGORY: Operations and Their Properties

SUB-CATEGORY: Multiplication and Division of Integers

OBJECTIVE: Given examples requiring multiplication or division of integers, the student will name the integer equivalent to each product or quotient.

SAMPLE ITEMS:

Determine the integer equivalent to the following product.

$$\begin{array}{r} -101 \\ \underline{\times \;\; 41} \end{array}$$

Answer: -4141

ITEM 1

Determine the integer equivalent to the following product.

$-3 \times (5 + 8)$

Answer: -39

ITEM 2

Determine the integer equivalent to the following quotient.

$$\frac{-48}{-8}$$

Answer: 6

ITEM 3

Determine the integer equivalent to the following quotient.

$-99 \div 1$

Answer: -99

ITEM 4

Objective 64 Math

IOX Acceptability Rating: 1 Grade 7-9

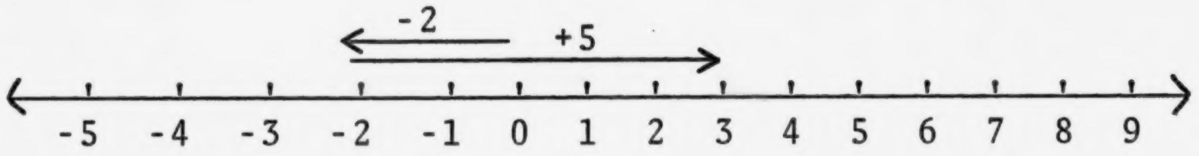
MAJOR CATEGORY: Operations and Their Properties

SUB-CATEGORY: Number Lines

OBJECTIVE: Given a number line picturing addition, subtraction, and multiplication operations with integers, the student will give the numerical statement pictured by each number line.

SAMPLE ITEMS:

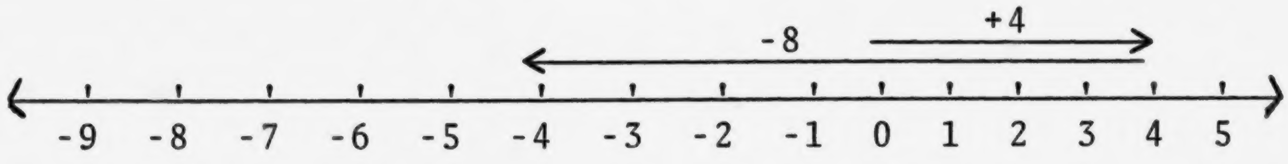
Give the numerical statement pictured by the following diagram.



Answer: -2 + 5 = 3

ITEM 1

Give the numerical statement pictured by the following diagram.



Answer: 4 + (-8) = -4

ITEM 2

Objective 65

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Operations and Their Properties

SUB-CATEGORY: Verbal Problems That Require Operations With Integers

OBJECTIVE: Given a verbal problem requiring operations with integers, the student will write a numerical expression that states each question and then simplify the expression.

SAMPLE ITEMS:

Write a numerical expression that states the following question and then simplify the expression.

Mrs. Jones, after years of donuts and hot fudge sundaes, was very fat! She went on a 1000 calorie diet. She lost 3 pounds the first week, 5 pounds the second week, but went to a bridge party the next week and stuffed herself, gaining 2 pounds that week. What was her net gain or loss?

Answer: (-3) + (-5) + 2 = -6

ITEM 1

Write a numerical expression that states the following question and then simplify the expression.

If the deepest point in the sea is 37,800 feet below sea level and the highest mountain top is 29,012 feet above sea level, find the difference in these elevations.

Answer: 29,012 - (-37,800) = 29,012 + 37,800 = 66,812

ITEM 2

Write a numerical expression that states the following question and then simplify the expression.

Suppose the city bus system is losing money at the rate of $1000 per day. Find its debt at the end of 7 days.

Answer: 7 x (-1000) = $7000

ITEM 3

Objective 66

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Operations and Their Properties

SUB-CATEGORY: Properties--Set of Integers

OBJECTIVE: Given a list of number properties and expressions involving operations with integers, the student will match the expression with the property which is the rationale for the expression.

SAMPLE ITEM:

Place the letter of the property which corresponds to the given expression in the space provided.

1. $1 \times -A = -A$
2. $-6 \times (4 + 3) = -6(4) + -6(3)$
3. $A \times 0 = 0$
4. $-6 \times 2 = 2 \times (-6)$
5. $4 + (-4) = 0$
6. $(-3 + -4) + 7 = -3 + (-4 + 7)$

A. Commutative for x
B. Associative for +
C. Distributive of x over +
D. Multiplicative Identity
E. Multiplicative Property of 0
F. Property of Opposites

Answer:
1. D
2. C
3. E
4. A
5. F
6. B

ITEM 1

Objective 67

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Operations and Their Properties

SUB-CATEGORY: Addition of Rationals

OBJECTIVE: Given at least two rational numbers, the student will find their sum.

SAMPLE ITEMS:

Simplify the following. $\frac{2}{3} + (-\frac{2}{3})$ Answer: 0 ITEM 1	Simplify the following. $-\frac{13}{23} + \frac{5}{23}$ Answer: $\frac{-8}{23}$ ITEM 2
Simplify the following. $-0.0017 + 0.048$ Answer: .0463 ITEM 3	Simplify the following. $-86\frac{1}{3} + \frac{5}{6}$ Answer: $-85\frac{1}{2}$ ITEM 4

Objective 68 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Operations and Their Properties

SUB-CATEGORY: Graphing Negatives or Opposites of Numbers

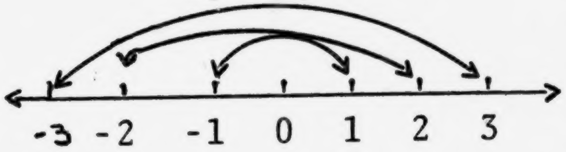
OBJECTIVE: Given a set of rational numbers, the student will graph the members of the set on a number line and also graph the negatives of the numbers and connect the respective negatives by an arrow.

SAMPLE ITEMS:

Graph on a number line the members of the given set and also the negatives of the members. Connect the respective negatives (or opposites) by an arrow.

-2, -1, 3

Answer:

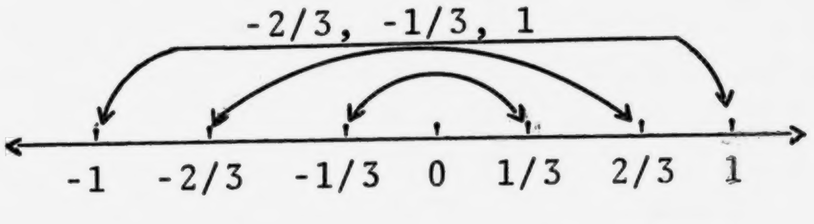


ITEM 1

Graph on a number line the members of the given set and also the negatives of the members. Connect the respective negatives (or opposites) by an arrow.

-2/3, -1/3, 1

Answer:

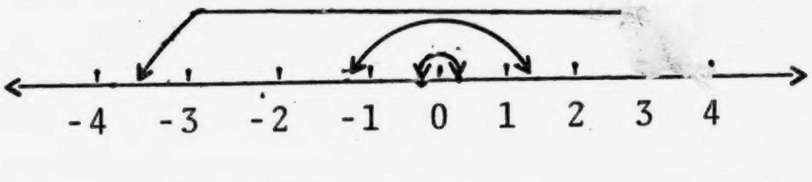


ITEM 2

Graph on a number line the members of the given set and also the negatives of the members. Connect the respective negatives (or opposites) by an arrow.

-3.5, -1.25, 0.25

Answer:



ITEM 3

Objective 69 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Operations and Their Properties

SUB-CATEGORY: Multiplication By Multiples of 10 Or Powers of 10

OBJECTIVE: Given a multiplication problem involving decimal fractions and multiples of 10 or powers of 10, the student will give the product orally within 3 seconds.

SAMPLE ITEMS:

Give the answer to the following problem orally.

18.257 x 100

Answer: 1825.7

ITEM 1

Give the answer to the following problem orally.

2.5 x 1000

Answer: 2500

ITEM 2

Give the answer to the following problem orally.

4.7×10^4

Answer: 47,000

ITEM 3

Give the answer to the following problem orally.

0.7842×10^3

Answer: 784.2

ITEM 4

Objective 70

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Operations and Their Properties

SUB-CATEGORY: Simplifying Expressions With Exponents

OBJECTIVE: Given an example involving powers, the student will simplify the expression and express the result as a power of 10.

SAMPLE ITEMS:

Express the following expression as a power of 10. $10^4 \times 10^3 =$ _____ Answer: 10^7 ITEM 1	Express the following expression as a power of 10. 10,000 = _____ Answer: 10^5 ITEM 2
Express the following expression as a power of 10. $\frac{10^7}{10^2} =$ _____ Answer: 10^4 ITEM 3	Express the following expression as a power of 10. $\frac{10^3}{10^2} =$ _____ Answer: 10^1 ITEM 4

Objective 71 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Operations and Their Properties

SUB-CATEGORY: Operations In Place-Value Systems Other Than Base 10

OBJECTIVE: Given 2 numerals in any base, 2-12, the student will add, subtract, or multiply the numerals.

SAMPLE ITEMS:

Solve the following problem using the indicated operation.

$$\begin{array}{r} 34_{\text{six}} \\ +\ 25_{\text{six}} \\ \hline \end{array}$$

Answer: 103_{six}

ITEM 1

Solve the following problem using the indicated operation.

$$\begin{array}{r} 40_{\text{five}} \\ -\ 34_{\text{five}} \\ \hline \end{array}$$

Answer: 1_{five}

ITEM 2

Solve the following problem using the indicated operation.

$$\begin{array}{r} 37_{\text{eight}} \\ \times\ 12_{\text{eight}} \\ \hline \end{array}$$

Answer: 466_{eight}

ITEM 3

Solve the following problem using the indicated operation.

$$\begin{array}{r} 31_{\text{four}} \\ +\ 23_{\text{four}} \\ \hline \end{array}$$

Answer: 200_{four}

ITEM 4

Objective 72 — Math

IOX Acceptability Rating: 1 — Grade 7-9

MAJOR CATEGORY: Operations and Their Properties

SUB-CATEGORY: Properties of Natural Numbers, Whole Numbers, Integers, Positive Rationals, Nonnegative Rationals, Nonpositive Rationals, Negative Rationals, Rationals of Addition

OBJECTIVE: Given a list of sets of number systems and a list of properties, the student will check the properties belonging to each number system.

SAMPLE ITEM: ITEM 1

In the following chart check the properties of addition which are true for each set of numbers.

SET OF NUMBERS	PROPERTIES OF ADDITION				
	ASSOCIATIVE	CLOSURE	COMMUTATIVE	IDENTITY	INVERSE
NATURAL NUMBERS					
WHOLE NUMBERS					
INTEGERS					
POSITIVE RATIONALS					
NONNEGATIVE RATIONALS					
NONPOSITIVE RATIONALS					
NEGATIVE RATIONALS					
RATIONALS					

Answer:

SET OF NUMBERS	PROPERTIES OF ADDITION				
	ASSOCIATIVE	CLOSURE	COMMUTATIVE	IDENTITY	INVERSE
NATURAL NUMBERS	X	X	X		
WHOLE NUMBERS	X	X	X	X	
INTEGERS	X	X	X	X	X
POSITIVE RATIONALS	X	X	X		
NONNEGATIVE RATIONALS	X	X	X	X	
NONPOSITIVE RATIONALS	X	X	X	X	
NEGATIVE RATIONALS	X	X	X		
RATIONALS	X	X	X	X	X

Objective 73 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Operations and Their Properties

SUB-CATEGORY: Closure

OBJECTIVE: Given sets of numerals, the student will select those which are closed under addition and those which are closed under multiplication.

SAMPLE ITEMS:

Circle those sets which are closed under addition.

A. {0, 1, 2, 3, 4, 5, 8, 12}

B. {0, 1}

C. {0}

D. {10, 20, 30, 40, 50, 60,...}

Answer: C, D

ITEM 1

Circle those sets which are closed under multiplication.

A. {0, 1, 2, 3}

B. {0, 1}

C. {1}

D. {10, 20, 30, 40, 50,...}

E. {15, 30, 45}

Answer: B, C, D

ITEM 2

Objective 74 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Operations and Their Properties

SUB-CATEGORY: Testing For A True Proportion By The Products Test (the product of the means equals the product of the extremes in a true proportion)

OBJECTIVE: Given 2 ratios which are set equal to each other, the student will use the products test to determine if the statement is a true proportion and label the statement true or false.

SAMPLE ITEMS:

Determine whether the following are true or false by using the products test. $4 : 3 = 36 : 27$ Answer: $108 = 108$ T ITEM 1	Determine whether the following are true or false by using the products test. $\frac{14}{10} = \frac{50}{35}$ Answer: $490 \neq 500$ F ITEM 2
Determine whether the following are true or false by using the products test. $\frac{5}{6} = \frac{15}{24}$ Answer: $120 \neq 90$ F ITEM 3	Determine whether the following are true or false by using the products test. $\frac{2}{3} : \frac{3}{4} = 7 : 7\frac{7}{8}$ Answer: $\frac{21}{4} = \frac{21}{4}$ T ITEM 4

Objective 75 — Math

IOX Acceptability Rating: 1 — Grade 7-9

MAJOR CATEGORY: Operations and Their Properties

SUB-CATEGORY: Ratio

OBJECTIVE: Given 2 numerals or 2 related measures, the student will express the ratio between them in lowest terms.

SAMPLE ITEMS:

Express the ratio of the following in lowest terms. 8 to 12 Answer: $\frac{2}{3}$ ITEM 1	Express the ratio of the following in lowest terms. 4 oz. to 1 lb. Answer: $\frac{1}{4}$ ITEM 2
Express the ratio of the following in lowest terms. 2 tons to 50 lb. Answer: $\frac{80}{1}$ ITEM 3	Express the ratio of the following in lowest terms. 1.8 to .2 Answer: $\frac{9}{1}$ ITEM 4

Objective 76 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Operations and Their Properties

SUB-CATEGORY: Solving Proportions for the Missing Term

OBJECTIVE: Given a proportion with one term unknown, the student will solve for the missing numeral.

SAMPLE ITEMS:

Find the missing numeral in the following proportion.

$6 : 15 = N : 75$

Answer: N = 30

ITEM 1

Find the missing numeral in the following proportion.

$$\frac{16}{20} = \frac{24}{N}$$

Answer: N = 30

ITEM 2

Find the missing numeral in the following proportion.

$12 : 8 = 9 : N$

Answer: N = 6

ITEM 3

Find the missing numeral in the following proportion.

$$\frac{4}{N} = \frac{1.2}{1.8}$$

Answer: N = 6

ITEM 4

Objective 77 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Operations and Their Properties

SUB-CATEGORY: Addition of Polynomials (Including Radicals)

OBJECTIVE: Given a set of polynomials, including radical expressions, the student will add by combining like terms.

SAMPLE ITEMS:

Add the following polynomial giving the answer in simplest form.

$$\begin{array}{rcrcr} x^2 & + & 18xy & + & 2y^2 \\ 10x^2 & - & xy & - & 8y^2 \\ 3x^2 & + & 4xy & - & y^2 \\ \hline \end{array}$$

Answer: $14x^2 + 21xy - 7y^2$

ITEM 1

Add the following polynomial giving the answer in simplest form.

$$(4x + 5x^2 - 3) + (8x + 2 + 3x^2) + (8x^2 - 6x + 3)$$

Answer: $16x^2 + 6x + 2$

ITEM 2

Add the following polynomial giving the answer in simplest form.

$$4a^2 - 6a - 4 + 6a^2 - 30a + 20 + a - 2a^2$$

Answer: $8a^2 - 35a + 16$

ITEM 3

Objective 78 — Math

IOX Acceptability Rating: 1 — Grade 7-9

MAJOR CATEGORY: Operations and Their Properties

SUB-CATEGORY: Multiplication and Division of Fractions Containing Polynomials and Radicals

OBJECTIVE: Given multiplication and/or division problems containing polynomials and radicals, the student will find the required products or quotients.

SAMPLE ITEMS:

Find the following product. $\frac{5}{a} \cdot \frac{a^2}{7} =$ Answer: $\frac{5a}{7}$ ITEM 1	Find the following product. $\frac{3(x+y)}{x-y} \cdot \frac{x-y}{x+y} =$ Answer: 3 ITEM 2
Find the following quotient. $\frac{a+b}{7} \div \frac{c}{14} =$ Answer: $\frac{2(a+b)}{c}$ or $\frac{2a+2b}{c}$ ITEM 3	Find the following quotient. $\frac{3\sqrt{m^3} + 5\sqrt{m^5}}{\sqrt{m}} =$ Answer: $3\sqrt{m^2} + 5\sqrt{m^4}$ or $3m + 5m^2$ ITEM 4

Math

Objective 79

Grade 7-9

IOX Acceptability RAting: 1

MAJOR CATEGORY: Operations and Their Properties

SUB-CATEGORY: Factorization of Polynomials

OBJECTIVE: Given a set of polynomials, the student will factor each into at least two factors.

SAMPLE ITEMS:

Factor the following polynomial. $mx^2 - mx - 2m$ Answer: $m(x^2 - x - 2)$ ITEM 1	Factor the following polynomial. $10ax^2 - 5x$ Answer: $5x(2ax - 1)$ ITEM 2
Factor the following polynomial. $x^2 + 10x + 25$ Answer: $(x + 5)(x + 5)$ ITEM 3	Factor the following polynomial. $36r^2 - 1$ Answer: $(6r - 1)(6r + 1)$ ITEM 4

Objective 80 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Operations and Their Properties

SUB-CATEGORY: Simplifying Fractions

OBJECTIVE: Given fractions containing polynomials, the student will simplify them.

SAMPLE ITEMS:

Reduce the following fraction. $\frac{x^2y}{xy^2}$ Answer: $\frac{x}{y}$ ITEM 1	Reduce the following fraction. $\frac{6(x + 2)}{9(x + 2)}$ Answer: $\frac{2}{3}$ ITEM 2
Reduce the following fraction. $\frac{2x}{4x - 8y}$ Answer: $\frac{x}{2x - 4y}$ ITEM 3	Reduce the following fraction. $\frac{a^2 - b^2}{a + b}$ Answer: $a - b$ ITEM 4

Objective 81

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Operations and Their Properties

SUB-CATEGORY: Complex Fractions Containing Polynomials

OBJECTIVE: Given a set of complex fractions containing polynomials, the student will simplify each expression.

SAMPLE ITEMS:

Simplify the following expression.

$$\frac{2 + \frac{1}{2}}{5 - \frac{1}{6}}$$

Answer: $\frac{15}{29}$

ITEM 1

Simplify the following expression.

$$\frac{\frac{x + y}{a}}{\frac{x - y}{a}}$$

Answer: $\frac{x + y}{x - y}$

ITEM 2

Simplify the following expression.

$$\frac{\frac{1}{y} - \frac{1}{x}}{1 - \frac{x}{y}}$$

Answer: $\frac{x - y}{x(y - x)}$ or $\frac{-1}{x}$

ITEM 3

Objective 82

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Operations and Their Properties

SUB-CATEGORY: Addition of Fractions Containing Polynomials

OBJECTIVE: Given a set of fractions containing polynomials, the student will find the sums.

SAMPLE ITEMS:

Find the following sum.

$$\frac{5}{18x^2y} + \frac{7}{12xy^3}$$

Answer: $\frac{10y^2 + 21x}{36x^2y^3}$

ITEM 1

Find the following sum.

$$\frac{6}{a - 3} - \frac{1}{a + 3}$$

Answer: $\frac{5a + 21}{(a - 3)(a + 3)}$

ITEM 2

Find the following sum.

$$\frac{7x}{x^2 - 25} - \frac{2}{3x - 15}$$

Answer: $\frac{19x - 10}{3(x + 5)(x - 5)}$

ITEM 3

Find the following sum.

$$\frac{3y}{y^2 - 9} + \frac{7}{6 - 2y}$$

Answer: $\frac{y + 21}{2(y + 3)(3 - y)}$

ITEM 4

Objective 83 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Operations and Their Properties

SUB-CATEGORY: Solving Linear Equations

OBJECTIVE: Given a set of linear equations, the student will solve for the unknown numeral by using any of the following: simplifying, adding inverses, multiplying by reciprocals.

SAMPLE ITEMS:

Solve the following linear equation. $x + 12 = 29$ Answer: $x = 17$ ITEM 1	Solve the following linear equation. $5x - x = 3x + 1$ Answer: $x = 1$ ITEM 2
Solve the following linear equation. $3(2x - 7) = 4x + x - 2$ Answer: $x = 19$ ITEM 3	Solve the following linear equation. $5y - 8 = 2y + 7$ Answer: $y = 5$ ITEM 4

Objective 84

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Operations and Their Properties

SUB-CATEGORY: Solution of Systems of Linear Equations

OBJECTIVE: Given a pair of linear equations with two unknowns, the student will solve for both of the unknown values.

SAMPLE ITEMS:

Solve the following for both unknowns.

$$\begin{aligned} x + y &= 12 \\ 2x - y &= 3 \end{aligned}$$

Answer: $x = 5$, $y = 7$

ITEM 1

Solve the following for both unknowns.

$$\begin{aligned} 3x - y &= 3 \\ x + 3y &= 11 \end{aligned}$$

Answer: $x = 2$, $y = 3$

ITEM 2

Solve the following for both unknowns.

$$\begin{aligned} x + y &= -1 \\ x + 2y &= -5 \end{aligned}$$

Answer: $x = 3$, $y = -4$

ITEM 3

Solve the following for both unknowns.

$$\begin{aligned} 3x + 2y &= -17 \\ x - 3y &= 9 \end{aligned}$$

Answer: $x = -3$, $y = -4$

ITEM 4

Objective 85

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Operations and Their Properties

SUB-CATEGORY: Solving Second Degree or Quadratic Equations

OBJECTIVE: Given a factorable 2nd degree equation, the student will write the equation in the form $ax^2 + bx + c = 0$ and solve for the unknown numeral by using the factorization method.

SAMPLE ITEMS:

Write the equation below in the form of $ax^2 + bx + c = 0$ and solve.

$$x^2 + x - 6 = 0$$

Answer: $x^2 + x - 6 = 0$,
$x = 2, -3$

ITEM 1

Write the equation below in the form of $ax^2 + bx + c = 0$ and solve.

$$2x^2 = 50x$$

Answer: $2x^2 - 50x = 0$,
$x = 0, 25$

ITEM 2

Write the equation below in the form of $ax^2 + bx + c = 0$ and solve.

$$x^2 + 6 = 5x$$

Answer: $x^2 - 5x + 6 = 0$,
$x = 2, 3$

ITEM 3

Write the equation below in the form of $ax^2 + bx + c = 0$ and solve.

$$3x^2 - 5x = x^2 - 2x + 9$$

Answer: $2x^2 - 3x - 9 = 0$,
$x = -\frac{3}{2}, 3$

ITEM 4

Objective 86 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Operations and Their Properties

SUB-CATEGORY: Solving 2nd Degree Equations

OBJECTIVE: Given a 2nd degree equation, the student will solve for the unknown value by using one of the following methods: factoring, completing the square, the quadratic formula.

SAMPLE ITEMS:

Solve the following equation using factoring, completing the square or the quadratic formula.

$$x^2 - x - 20 = 0$$

Answer: $x = 5, -4$

ITEM 1

Solve the following equation using factoring, completing the square or the quadratic formula.

$$x^2 - 2x - 5 = 0$$

Answer: $x = 1 + \sqrt{6}, 1 - \sqrt{6}$

ITEM 2

Solve the following equation using factoring, completing the square or the quadratic formula.

$$3x^2 - x - 5 = 0$$

Answer: $x = \frac{1 - \sqrt{61}}{6}, \frac{1 + \sqrt{61}}{6}$

ITEM 3

Objective 87
IOX Acceptability Rating: 1

Math
Grade 7-9

MAJOR CATEGORY: Operations and Their Properties

SUB-CATEGORY: Division of Polynomials (Including Radicals)

OBJECTIVE: Given a division problem with polynomials, the student will find the indicated quotient.

SAMPLE ITEMS:

Find the following quotient. $\frac{15x + 10y}{5}$ Answer: $3x + 2y$ ITEM 1	Find the following quotient. $\frac{8m^4 - 9m^5}{m^3}$ Answer: $8m - 9m^2$ ITEM 2
Find the following quotient. $\frac{x^2 - 2x - 35}{x + 5}$ Answer: $x - 7$ ITEM 3	Find the following quotient. $\frac{3\sqrt{m^2} + 5\sqrt{m^5}}{\sqrt{m}}$ Answer: $3\sqrt{m^2} + 5\sqrt{m^4}$ or $3m + 5m^2$ ITEM 4

Objective 88 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Operations and Their Properties

SUB-CATEGORY: Per Cent

OBJECTIVE: Given a fraction, the student will express it as a decimal fraction and as a per cent.

SAMPLE ITEMS:

Express the following as a decimal and as a per cent. $\frac{3}{5}$ Answer: .60 60% ITEM 1	Express the following as a decimal and as a per cent. $\frac{5}{1000}$ Answer: .005 .5% ITEM 2
Express the following as a decimal and as a per cent. $3\frac{1}{4}$ Answer: 3.25 325% ITEM 3	Express the following as a decimal and as a per cent. $\frac{13}{20}$ Answer: .65 65% ITEM 4

Objective 89 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Operations and Their Properties

SUB-CATEGORY: Per Cent

OBJECTIVE: Given a decimal fraction, the student will express it as a common fraction and as a per cent, and given a per cent, the student will express it as a decimal fraction and as a common fraction.

SAMPLE ITEMS:

Express the following as a common fraction and as a per cent. .125 Answer: $\frac{1}{8}$, 12.5% ITEM 1	Express the following as a common fraction and as a decimal fraction. $37\frac{1}{2}\%$ Answer: $\frac{3}{8}$, .375 ITEM 2
Express the following as a common fraction and as a per cent. .005 Answer: $\frac{1}{200}$, .5% ITEM 3	Express the following as a common fraction and as a decimal fraction. 250% Answer: $\frac{5}{2}$, 2.5 ITEM 4

Objective 90 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Operations and Their Properties

SUB-CATEGORY: Per Cent

OBJECTIVE: Given a problem involving a per cent, the student will compute to find the missing percentage, base or rate.

SAMPLE ITEMS:

Compute the following. 36% x 105 = Answer: 37.8 ITEM 1	Compute the following. 325% of 2.7 = Answer: 8.775 ITEM 2
Compute the following. 54 is 60% of what number? Answer: 90 ITEM 3	Compute the following. 300% of what number is 30.6? Answer: 10.2 ITEM 4

Objective 91

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Operations and Their Properties

SUB-CATEGORY: Per Cent

OBJECTIVE: Given a business problem involving interest, discount, net price, profit, rate of increase or decrease, commission, taxes, or list price, the student will compute the answer.

SAMPLE ITEMS:

Solve the following problem.

What is the interest charged for borrowing $500 for three years, if the rate of interest is 6% per year?

Answer: $90

ITEM 1

Solve the following problem.

The marked price on a school blazer was $25.00. If Lois purchased it at a 10% discount, what was the net price she paid for the blazer?

Answer: $22.50

ITEM 2

Solve the following problem.

If a $2,000 car is sold at a 17% profit beyond that cost, what will be the selling price of the car?

Answer: $2,340

ITEM 3

Objective 92

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Operations and Their Properties

SUB-CATEGORY: Inverse Operations

OBJECTIVE: Given pairs of statements, some of which exemplify inverse operations with natural numbers, the student will identify those which are true.

SAMPLE ITEM:

Label the statements which are true according to what you have learned about inverse operations. If a, b, c are natural numbers, then:

A) If $a \times b = c$, then $c \div a = b$

B) If $a \times b = c$, then $\frac{c}{a} = b$

C) If $a + b = c$, then $a \times b = c$

D) If $a + b = c$, then $c - b = a$

E) If $140 \div 10 = 14$, then $140 \times 10 = 14$

F) If $\frac{84}{12} = 7$, then $12 \times 7 = 84$

Answer: A, B, D, and F are true statements

ITEM 1

Objective 93 Math

IOX Acceptability Rating: 1 Grade

MAJOR CATEGORY: Operations and Their Properties

SUB-CATEGORY: Reflexive Property

OBJECTIVE: Given names for numbers, the student will show the reflexive property (a = a) by writing names for numbers which are symbols for the numbers given'

SAMPLE ITEM:

Complete the following by writing another name for the numbers given and show that the reflexive property is being shown.

A) $2 + 4$

B) $8 \div 4$

C) $7x - 10x$

D) $-2y(4y)$

Answer: (Answers will vary)

A) $2 + 4 = 18 \div 3$
$6 = 6$

B) $8 \div 4 = 2 + 0$
$2 = 2$

C) $7x - 10x = -2x + (-x)$
$-3x = -3x$

D) $-2y(4y) = -10y^2 - (-2y^2)$
$-8y^2 = -8y^2$

ITEM 1

Objective 94 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Operations and Their Properties

SUB-CATEGORY: Symmetric Property

OBJECTIVE: Given a set of mathematical sentences, the student will show the symmetric property by rewriting each sentence.

SAMPLE ITEMS:

Rewrite the following mathematical sentence to show the symmetric property. $2 + 3 = 6 - 1$ Answer: $6 - 1 = 2 + 3$ ITEM 1	Rewrite the following mathematical sentence to show the symmetric property. $3 \cdot 6 = 18$ Answer: $18 = 3 \cdot 6$ ITEM 2
Rewrite the following mathematical sentence to show the symmetric property. $27 = 5x - 2y$ Answer: $5x - 2y = 27$ ITEM 3	Rewrite the following mathematical sentence to show the symmetric property. $7x + 5 = 6x - 9$ Answer: $6x - 9 = 7x + 5$ ITEM 4

Objective 95

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Operations and Their Properties

SUB-CATEGORY: Transitive (or Substitution) Property

OBJECTIVE: Given pairs of related mathematical sentences in the form of $a = b$ and $b = c$, the student will write a third sentence which will illustrate the transitive property. ($a = b$ and $b = c$, then $a = c$)

SAMPLE ITEMS:

Write a mathematical sentence for the following pair of sentences to show the transitive property. $3 + 4 = 5 + 2$ $5 + 2 = 7$ Answer: $3 + 4 = 7$ ITEM 1	Write a mathematical sentence for the following pair of sentences to show the transitive property. $3x = 2y$ $2y = 12$ Answer: $3x = 12$ ITEM 2
Write a mathematical sentence for the following pair of sentences to show the transitive property. $5x = 7y$ $7y = -2z$ Answer: $5x = -2z$ ITEM 3	Write a mathematical sentence for the following pair of sentences to show the transitive property. $3x + 2 = y$ $y = 2z + 3$ Answer: $3x + 2 = 2z + 3$ ITEM 4

Objective 96 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Operations and Their Properties

SUB-CATEGORY: Square Root--To the Nearest Tenth

OBJECTIVE: Given an indicated square root, the student will approximate the square root to the nearest tenth.

SAMPLE ITEMS:

Approximate the indicated square root to the nearest tenth.

$\sqrt{42}$

Answer: 6.5

ITEM 1

Approximate the indicated square root to the nearest tenth.

$\sqrt{468}$

Answer: 21.6

ITEM 2

Approximate the indicated square root to the nearest tenth.

$\sqrt{1600}$

Answer: 40.0

ITEM 3

Approximate the indicated square root to the nearest tenth.

$\sqrt{91}$

Answer: 9.5

ITEM 4

Objective 97 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Operations and Their Properties

SUB-CATEGORY: Radical Expressions (Square Root)

OBJECTIVE: Given an expression which contains radicals, the student will perform the indicated operations and simplify the result (if possible).

SAMPLE ITEMS:

Simplify (if possible) the following expression.

$$\sqrt{9} - 2 + 3\sqrt{4} + \sqrt{25}$$

Answer: $3 - 2 + 3(2) + 5 = 3 - 2 + 6 + 5 = 12$

ITEM 1

Simplify (if possible) the following expression.

$$5\sqrt{2} - 2\sqrt{2} + 6\sqrt{2}$$

Answer: $(5 - 2 + 6)\sqrt{2} = 9\sqrt{2}$

ITEM 2

Simplify (if possible) the following expression.

$$2\sqrt{2}\,(5\sqrt{8} - 3\sqrt{2})$$

Answer: $10\sqrt{16} - 6\sqrt{4} = 10(4) - 6(2) = 40 - 12 = 28$

ITEM 3

Simplify (if possible) the following expression.

$$2\sqrt{18} + 4\sqrt{27}$$

Answer: $2\sqrt{9} \cdot \sqrt{2} + 4\sqrt{9} \cdot \sqrt{3} = 2 \cdot 3\sqrt{2} + 4 \cdot 3\sqrt{3} = 6(\sqrt{2} + 2\sqrt{3})$

ITEM 4

Objective 98 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Operations and Their Properties

SUB-CATEGORY: Reflexive, Symmetric, Transitive Properties

OBJECTIVE: Given an example which illustrates a property of equality, the student will identify it as an illustration of the reflexive, transitive or symmetric property.

SAMPLE ITEMS:

In the following identify the property of equality which is illustrated. Use S for symmetric, T for transitive, R for reflexive.

If 5 + 6 = 14 - 3, then 14 - 3 = 5 + 6

Answer: S

ITEM 1

In the following identify the property of equality which is illustrated. Use S for symmetric, T for transitive, R for reflexive.

If 5 + 6 = 11, and 11 = 14 - 3, then 5 + 6 = 14 - 3

Answer: T

ITEM 2

In the following identify the property of equality which is illustrated. Use S for symmetric, T for transitive, R for reflexive.

$r + s = r + s$

Answer: R

ITEM 3

Objective 99 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Measurement

SUB-CATEGORY: Addition and Subtraction of Measures

OBJECTIVE: Given at least two related measures, the student will add or subtract the measures and express in simplest form.

SAMPLE ITEMS:

Add the following measures.

$$\begin{array}{r} 3 \text{ lb. } 8 \text{ oz.} \\ 2 \text{ lb. } 4 \text{ oz.} \\ + \; 5 \text{ lb. } 8 \text{ oz.} \\ \hline \end{array}$$

Answer: 11 lb. 4 oz.

ITEM 1

Add the following measures.

$$\begin{array}{r} 16 \text{ yd. } 2 \text{ ft.} \\ 3 \text{ yd. } 1 \text{ ft.} \\ + \; 10 \text{ yd. } 1 \text{ ft.} \\ \hline \end{array}$$

Answer: 30 yd. 1 ft.

ITEM 2

Subtract the following measures.

5 ft. 7 in. - 47 in. = _____

Answer: 1 ft. 8 in.

ITEM 3

Subtract the following measures.

$$\begin{array}{r} 6 \text{ bu. } 3 \text{ pk.} \\ - \; 2 \text{ bu. } 2 \text{ pk.} \\ \hline \end{array}$$

Answer: 4 bu. 1 pk.

ITEM 4

Objective 100 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Measurement

SUB-CATEGORY: Multiplication and Division of Measures

OBJECTIVE: Given a measure, a natural number, and an indicated operation, the student will multiply or divide, as the sign indicates.

SAMPLE ITEMS:

Solve the problem and express the answer in simplest form.

$$\begin{array}{r} 1\text{ hr. }13\text{ min.} \\ \times\ 5 \\ \hline \end{array}$$

Answer: 6 hr. 5 min.

ITEM 1

Solve the problem and express the answer in simplest form.

$$\begin{array}{r} 3\text{ qt. }1\text{ pt.} \\ \times\ 6 \\ \hline \end{array}$$

Answer: 21 qt.

ITEM 2

Solve the problem and express the answer in simplest form.

$$4\overline{)9\text{ hr. }30\text{ min.}}$$

Answer: 2 hr. $22\frac{1}{2}$ min.

ITEM 3

Solve the problem and express the answer in simplest form.

$$\frac{5\text{ yd. }20\text{ in.}}{2}$$

Answer: 2 yd. 28 in. or
2 yd. 2 ft. 4 in.

ITEM 4

Objective 101 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Measurement

SUB-CATEGORY: Weight Measures--British-American
Ounces, Pounds, Tons

OBJECTIVE: Given a standard measure of weight in the British-American system (or English system), the student will convert to an indicated equivalent measure.

SAMPLE ITEMS:

Convert the given measure to the indicated equivalent measure. 3 tons = _____ pounds Answer: 6,000 pounds ITEM 1	Convert the given measure to the indicated equivalent measure. 4 pounds = _____ ounces Answer: 64 ounces ITEM 2
Convert the given measure to the indicated equivalent measure. 18,000 pounds = _____ tons Answer: 9 tons ITEM 3	Convert the given measure to the indicated equivalent measure. 84 ounces = _____ pounds Answer: $5\frac{1}{4}$ pounds ITEM 4

Objective 102 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Measurement

SUB-CATEGORY: Measures of Time--Hour, Minute, Day, Year, Second, Decade

OBJECTIVE: Given a time interval, the student will convert to an indicated equivalent unit of time.

SAMPLE ITEMS:

Convert the given time interval to the indicated equivalent unit of time. 5 hours = _____ minutes Answer: 300 minutes ITEM 1	Convert the given time interval to the indicated equivalent unit of time. 180 seconds = _____ minutes Answer: 3 minutes ITEM 2
Convert the given time interval to the indicated equivalent unit of time. 120 years = _____ decades Answer: 12 decades ITEM 3	Convert the given time interval to the indicated equivalent unit of time. 5 years = _____ days Answer: 1825 to $1826\frac{1}{4}$ days ITEM 4

Objective 103 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Measurement

SUB-CATEGORY: Dry Measure--British-American

OBJECTIVE: Given a dry measure, the student will convert to an indicated equivalent measure.

SAMPLE ITEMS:

Convert the given dry measure to the indicated measure. 2 bushels = _____ pecks Answer: 8 pecks ITEM 1	Convert the given dry measure to the indicated measure. 3 pecks = _____ quarts Answer: 24 quarts ITEM 2
Convert the given dry measure to the indicated measure. 1 dry quart = _____ pints Answer: 2 pints ITEM 3	Convert the given dry measure to the indicated measure. 8 pints = _____ dry quarts Answer: 4 dry quarts ITEM 4

Objective 104 | Math

IOX Acceptability Rating: 1 | Grade 7-9

MAJOR CATEGORY: Measurement

SUB-CATEGORY: Atomic Weights and Molecular Weights

OBJECTIVE: Given the chart of atomic weights of elements and a list of molecules and their respective components, the student will find the molecular weight of each molecule.

SAMPLE ITEM:

Use the chart to determine the molecular weight of the molecules.

ELEMENT	ATOMIC WEIGHT
Hydrogen	1.008
Helium	4.003
Carbon	12.01
Oxygen	16
Magnesium	24.32
Sulfur	32.07
Iron	55.85
Copper	63.54

A) Hydrogen Peroxide (2 hydrogen, 2 oxygen)

B) Water (hydrogen and oxygen)

Answer: A) 34.02 or 34.016

B) 18.02 or 18.016

ITEM 1

Objective 105

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Measurement

SUB-CATEGORY: Feet, Inches, Yards

OBJECTIVE: Given a linear measurement, the student will find at least two equivalent measures.

SAMPLE ITEMS:

Write two other names for the following measurement. Express parts of measures as fractions in lowest terms. 52 in. Answer: 4' 4" $4\frac{1}{3}$ ft. ITEM 1	Write two other names for the following measurement. Express parts of measures as fractions in lowest terms. 9 ft. Answer: 3 yd. 108 in. ITEM 2
Write two other names for the following measurement. Express parts of measures as fractions in lowest terms. 95 ft. Answer: 1140 in. $31\frac{2}{3}$ yd. ITEM 3	Write two other names for the following measurement Express parts of measures. as fractions in lowest terms. 5 yd. Answer: 15 ft. 108 in. ITEM 4

Objective 106 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Measurement

SUB-CATEGORY: Temperature Scales--Conversion

OBJECTIVE: Given the formula for the conversion of Fahrenheit to Centigrade (Celsius) and Centigrade to Fahrenheit, and a temperature reading, the student will use the formula to find the corresponding temperature readings

SAMPLE ITEMS:

Using the formula $(F = \frac{9}{5} C + 32)$ find the Fahrenheit reading that corresponds to a Celsius reading of:

1) 20° 2) 30° 3) 100°

Answer: 1) 68° F
2) 86° F
3) 212° F

ITEM 1

Using the formula $\left[C = \frac{5}{9}(F - 32)\right]$ find the Celsius reading that corresponds to a Fahrenheit reading of the following. Express your answers correct to the nearest tenth.

1) 35° 2) 52° 3) 60°

Answer: 1) 1.7° C
2) 11.1° C
3) 15.6° C

ITEM 2

Objective 107 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Measurement

SUB-CATEGORY: Liquid Measure--British-American
Gallons, Quarts, Pints

OBJECTIVE: Given a liquid measure, the student will find an indicated equivalent measure.

SAMPLE ITEMS:

Convert the given liquid measure to the indicated equivalent measure.

4 gallons = _____ quarts

Answer: 16 quarts

ITEM 1

Convert the given liquid measure to the indicated equivalent measure.

2 pints = _____ fluid ounces

Answer: 32 fluid ounces

ITEM 2

Convert the given liquid measure to the indicated equivalent measure.

25 quarts = _____ gallons

Answer: $6\frac{1}{4}$ gallons

ITEM 3

Convert the given liquid measure to the indicated equivalent measure.

8 fluid ounces = _____ pints

Answer: $\frac{1}{2}$ pint

ITEM 4

Objective 108 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Measurement

SUB-CATEGORY: Circles--Verbally Stated Problems

OBJECTIVE: Given a verbally stated problem requiring knowledge of area and circumference of the circle, the student will solve the problem.

SAMPLE ITEMS:

Give the answer to the nearest 0.01 inch.

If a semicircle is 46 inches long, what is the radius of the semicircle? $\pi = 3.14$

Answer: 14.65 inches

ITEM 1

Give the answer to the nearest 0.01 inch.

If the circumference of a circle is 22 feet, what is the diameter of the circle? $\pi = \frac{22}{7}$

Answer: 7.0 feet

ITEM 2

Math

Objective 109

Grade 7-9

IOX Acceptability Rating: 1

MAJOR CATEGORY: Measurement

SUB-CATEGORY: Circles--Areas

OBJECTIVE: Given the measure of a radius or a diameter, the student will find the area of a circle and express it in square units of measure.

SAMPLE ITEMS:

Find the area of the following circle using the measurement given. Your answer should be correct to the nearest tenth. $\pi = 3.14$

$r = 10$ ft.

Answer: 314 square feet

ITEM 1

Find the area of the following circle using the measurement given. Your answer should be correct to the nearest tenth. $\pi = 3.14$

$r = 7\frac{1}{2}$ ft.

Answer: 176.6 square feet

ITEM 2

Find the area of the following circle using the measurement given. Your answer should be correct to the nearest tenth. $\pi = 3.14$

$d = 20$ cm.

Answer: 314 sq. centimeters

ITEM 3

Find the area of the following circle using the measurement given. Your answer should be correct to the nearest tenth. $\pi = 3.14$

$d = 15$ cm.

Answer: 176.6 sq. centimeters

ITEM 4

Objective 110 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Measurement

SUB-CATEGORY: Circles--Circumference

OBJECTIVE: Given the measure of a radius or diameter of a circle, the student will compute the circumference.

SAMPLE ITEMS:

Find the circumference of the following circle using the measurement given. Your answer should be correct to the nearest tenth. $\pi = 3.14$

$d = 6$ ft.

Answer: 18.84 feet

ITEM 1

Find the circumference of the following circle using the measurement given. Your answer should be correct to the nearest tenth. $\pi = 3.14$

$r = 6.7$ in.

Answer: 42.1 inches

ITEM 2

Find the circumference of the following circle using the measurement given. Your answer should be correct to the nearest tenth. $\pi = 3.14$

$r = 4$ in.

Answer: 25.12 inches

ITEM 3

Find the circumference of the following circle using the measurement given. Your answer should be correct to the nearest tenth. $\pi = 3.14$

$d = 16$ in.

Answer: 50.24 inches

ITEM 4

Objective 111 Math

IOX Acceptability Rating: 1 Grade 7-9

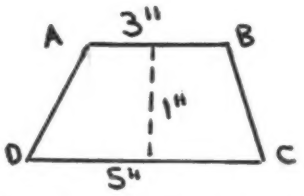
MAJOR CATEGORY: Measurement

SUB-CATEGORY: Measuring Regions in a Plane

OBJECTIVE: Given the lengths of the parallel sides and the height (altitude) of a trapezoid, the student will find the area and express it in square units of measure.

SAMPLE ITEMS:

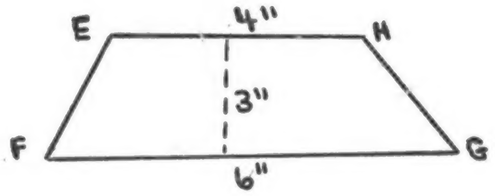
Find the area of the following trapezoid.



Answer: Area = 4 square inches

ITEM 1

Find the area of the following trapezoid.



Answer: Area = 15 square inches

ITEM 2

Objective 112

IOX Acceptability Rating: 1

Math

Grade 7-9

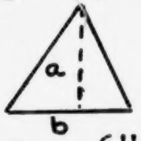
MAJOR CATEGORY: Measurement

SUB-CATEGORY: Measuring Regions in a Plane

OBJECTIVE: Given measures of the base and altitude, the student will find the area of a rectangle, a square, a triangle, a parallelogram, or a rhombus.

SAMPLE ITEMS:

Find the area of the following polygon.



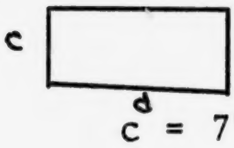
a = 6"

b = 4"

Answer: 12 sq. in.

ITEM 1

Find the area of the following polygon.



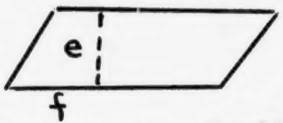
c = 7"

d = 10"

Answer: 70 sq. in.

ITEM 2

Find the area of the following polygon.



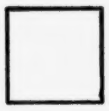
e = 5.4"

f = $3\frac{1}{2}$"

Answer: 18.9 sq. in. or $18\frac{9}{10}$ sq. in.

ITEM 3

Find the area of the following polygon.



g = 12"

h = 12"

Answer: 144 sq. in.

ITEM 4

3

Objective 113 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Measurement

SUB-CATEGORY: Measuring Regions in a Plane

OBJECTIVE: Given the measure of one angle of a parallelogram, the student will compute the measures of the other angles.

SAMPLE ITEMS:

In parallelogram ABCD find the measures of the other 3 angles if BCD is equivalent to

60°

Answer: 120°, 60°, 120°

ITEM 1

In parallelogram ABCD find the measures of the other 3 angles if BCD is equivalent to

100°

Answer: 80°, 100°, 80°

ITEM 2

In parallelogram ABCD find the measures of the other 3 angles if BCD is equivalent to

72°

Answer: 108°, 72°, 108°

ITEM 3

In parallelogram ABCD find the measures of the other 3 angles if BCD is equivalent to

30°

Answer: 150°, 30°, 150°

ITEM 4

Objective 114

IOX Acceptability Rating: 1

Math

Grade 7-9

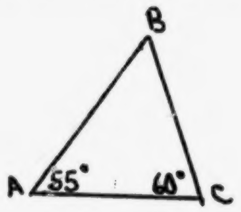
MAJOR CATEGORY: Measurement

SUB-CATEGORY: Polygons--Finding the Missing Angle

OBJECTIVE: Given a polygon of n sides and the measures of n-1 angles, the student will compute the measure of the missing angle.

SAMPLE ITEMS:

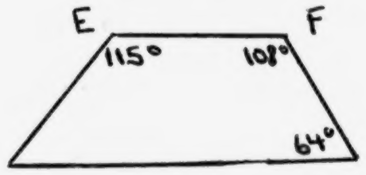
Compute the measure of the missing angle in the following polygon.



Answer: <B = 65°

ITEM 1

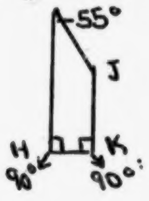
Compute the measure of the missing angle in the following polygon.



Answer: <D = 73°

ITEM 2

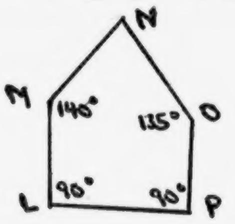
Compute the measure of the missing angle in the following polygon.



Answer: <J = 125°

ITEM 3

Compute the measure of the missing angle in the following polygon.



Answer: <N = 85°

ITEM 4

Objective 115 Math

IOX Acceptability Rating: 1 Grade 7-9

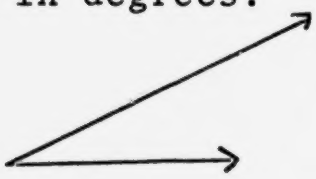
MAJOR CATEGORY: Measurement

SUB-CATEGORY: Using a Protractor to Draw Angles

OBJECTIVE: Given an angle of a given measurement and a protractor and a straightedge, the student will measure the angles to the nearest degree.

SAMPLE ITEMS:

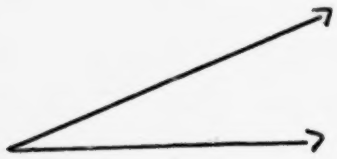
Measure the following angle with a protractor and state its value in degrees.



Answer: 24°

ITEM 1

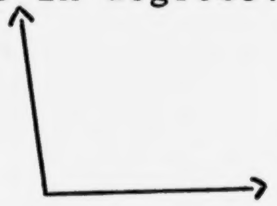
Measure the following angle with a protractor and state its value in degrees.



Answer: 14°

ITEM 2

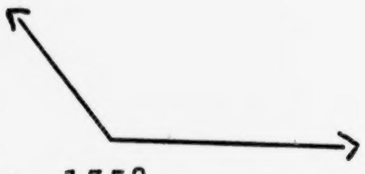
Measure the following angle with a protractor and state its value in degrees.



Answer: 98°

ITEM 3

Measure the following angle with a protractor and state its value in degrees.



Answer: 135°

ITEM 4

Objective 116
IOX Acceptability Rating: 1

Math
Grade 7-9

MAJOR CATEGORY: Measurement

SUB-CATEGORY: Supplementary and Complementary Angles

OBJECTIVE: Given a measurement in degrees, the student will give the measure of the angles that are supplementary and complementary (if possible) to the angle with the given measure.

SAMPLE ITEMS:

Give the measure in degrees
of the angles that are
A) supplementary and
B) complementary (if possible)
to the given angle.

10°

Answer: A) 170°
B) 80°

ITEM 1

Give the measure in degrees
of the angles that are
A) supplementary and
B) complementary (if possible)
to the given angle.

150°

Answer: A) 30°
B) none

ITEM 2

Give the measure in degrees
of the angles that are
A) supplementary and
B) complementary (if possible)
to the given angle.

45°

Answer: A) 135°
B) 45°

ITEM 3

Give the measure in degrees
of the angles that are
A) supplementary and
B) complementary (if possible)
to the given angle.

90°

Answer: A) 90°
B) 0°

ITEM 4

Objective 117 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Measurement

SUB-CATEGORY: Greatest Possible Error

OBJECTIVE: Given a measurement, the student will find the greatest possible error.

SAMPLE ITEM:

Find the greatest possible error for the following measurement. $2\frac{1}{4}$ tons Answer: $\frac{1}{8}$ ton ITEM 1	Find the greatest possible error for the following measurement. $\frac{5}{8}$ inch Answer: $\frac{1}{16}$ ITEM 2
Find the greatest possible error for the following measurement. 2 lb. 4 oz. Answer: $\frac{1}{2}$ oz. ITEM 3	Find the greatest possible error for the following measurement. $5\frac{3}{16}$ inches Answer: $\frac{1}{32}$ in. ITEM 4

Objective 118 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Measurement

SUB-CATEGORY: Metric System of Measure--Length

OBJECTIVE: Given a metric linear unit, the student will express it as a multiple of a meter using decimal or power notation.

SAMPLE ITEMS:

Express the following unit as a multiple of a meter using decimal or power notation.

millimeter

Answer: $\frac{1}{1000}$ m. or
10^{-3} of a meter

ITEM 1

Express the following unit as a multiple of a meter using decimal or power notation.

centimeter

Answer: $\frac{1}{100}$ m. or
10^{-2} of a meter

ITEM 2

Express the following unit as a multiple of a meter using decimal or power notation.

decimeter

Answer: $\frac{1}{10}$ m. or
10^{-1} of a meter

ITEM 3

Express the following unit as a multiple of a meter using decimal or power notation.

kilometer

Answer: 1000 m. or
10^{3} of a meter

ITEM 4

Objective 119
IOX Acceptability Rating: 1

Math
Grade 7-9

MAJOR CATEGORY: Measurement

SUB-CATEGORY: Relative Error

OBJECTIVE: Given a measure and the greatest possible error of the measure, the student will compute the relative error and express it as a fraction, a decimal, and a per cent.

SAMPLE ITEMS:

Find the relative error of the following measure. Express it as a fraction, a decimal, and a per cent.

3 tons

Answer: $\frac{1}{6}$, 0.167, $16\frac{2}{3}\%$

ITEM 1

Find the relative error of the following measure. Express it as a fraction, a decimal, and a per cent.

10 inches

Answer: $\frac{1}{20}$, 0.05, 5%

ITEM 2

Find the relative error of the following measure. Express it as a fraction, a decimal, and a per cent.

6 feet

Answer: $\frac{1}{12}$, 0.08, 8%

ITEM 3

Find the relative error of the following measure. Express it as a fraction, a decimal, and a per cent.

4 yards

Answer: $\frac{1}{8}$, 0.125, 12.5%

ITEM 4

Objective 120 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Measurement

SUB-CATEGORY: Right Rectangular Prisms--Volumes and Surface Areas

OBJECTIVE: Given a prism whose base is a rectangle with length l and width w and whose altitude has length h, the student will find the volume, lateral surface area, and total surface area.

SAMPLE ITEMS:

Find the A) volume, B) lateral surface area, and C) total surface area of the given right rectangular prism.

l = 2" w = 3" h = 4"

Answer: A) 24 cu. in. B) 40 sq. in. C) 52 sq. in.

ITEM 1

Find the A) volume, B) lateral surface area, and C) total surface area of the given right rectangular prism.

l = 4" w = 2" h = 7"

Answer: A) 56 cu. in. B) 84 sq. in. C) 100 sq. in.

ITEM 2

Find the A) volume, B) lateral surface area, and C) total surface area of the given right rectangular prism.

$l = \frac{1}{2}'$ w = 3' h = 1'

Answer: A) $1\frac{1}{2}$ cu. ft. B) 7 sq. ft. C) 10 sq. ft.

ITEM 3

Objective 121 Math

IOX Acceptability Rating: 1 Grade 7-9

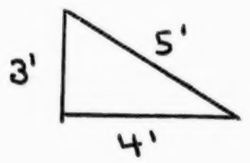
MAJOR CATEGORY: Measurement

SUB-CATEGORY: Perimeter of Polygons

OBJECTIVE: Given a regular or irregular polygon of n sides and the measures of each side, the student will find the perimeter of the polygon.

SAMPLE ITEMS:

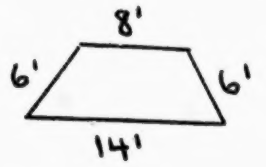
Find the perimeter of the following polygon.



Answer: 12'

ITEM 1

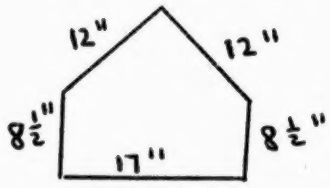
Find the perimeter of the following polygon.



Answer: 34'

ITEM 2

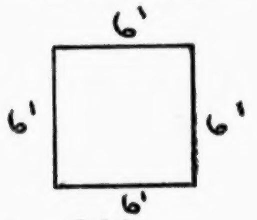
Find the perimeter of the following polygon.



Answer: 58"

ITEM 3

Find the perimeter of the following polygon.



Answer: 24'

ITEM 4

Objective 122

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Measurement

SUB-CATEGORY: Metric System--Conversion of Linear Units

OBJECTIVE: Given a table of equivalent linear units (metric and English) and a set of measures, the student will convert the given measures from one system to the other.

SAMPLE ITEM:

Using the given table convert the following measurements.

1) 384' = _____ meters

2) 3 in. = _____ cm.

3) 4 km. = _____ mi.

4) 2 m. = _____ in.

Metric	English
1 mm.	0.04 in.
1 cm.	0.39 in.
1 m.	39.37 in.
1 km.	.62 mi.
2.54 cm.	1 in.
0.30 m.	1 ft.
0.91 m.	1 yd.
1.61 km.	1 mi.

Answer: 1) 115.20 m.

2) 7.62 cm.

3) 2.48 mi.

4) 78.74 in.

ITEM 1

Objective 123

IOX Acceptability Rating: 1

Math

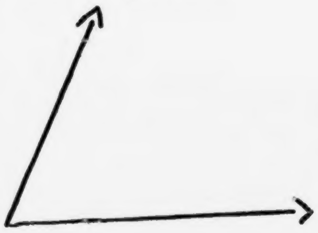
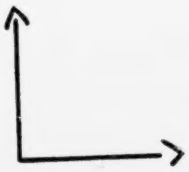
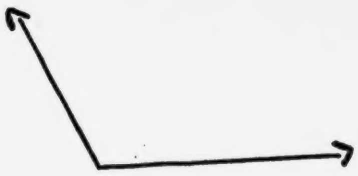
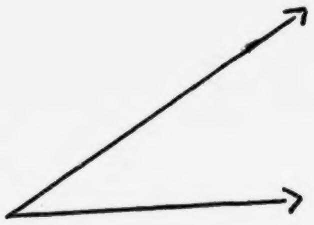
Grade 7-9

MAJOR CATEGORY: Measurement

SUB-CATEGORY: Angle Measurement

OBJECTIVE: Given an angle and a protractor, the student will measure the given angle correct within 2 degrees and classify it as acute, obtuse, or right.

SAMPLE ITEMS:

Measure the following angle and classify it as acute, right, or obtuse.  Answer: 61° Acute ITEM 1	Measure the following angle and classify it as acute, right, or obtuse.  Answer: 90° Right ITEM 2
Measure the following angle and classify it as acute, right, or obtuse.  Answer: 123° Obtuse ITEM 3	Measure the following angle and classify it as acute, right, or obtuse.  Answer: 24° Acute ITEM 4

Objective 124 Math

IOX Acceptability Rating: 1 Grade 7-9

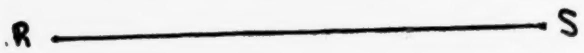
MAJOR CATEGORY: Measurement

SUB-CATEGORY: Measuring Line Segments

OBJECTIVE: Given a line segment and a ruler, the student will measure the segment and express his approximation to the nearest inch, $\frac{1}{2}$ inch, $\frac{1}{4}$ inch, and $\frac{1}{8}$ inch.

SAMPLE ITEMS:

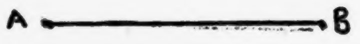
Measure the given segment correct to the nearest A) inch B) $\frac{1}{2}$ inch C) $\frac{1}{4}$ inch D) $\frac{1}{8}$ inch



Answer: $\overline{RS}$ A) 2" B) 2" C) $\frac{9''}{4}$ or $2\frac{1''}{4}$

ITEM 1

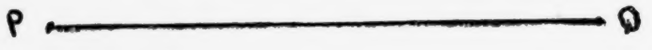
Measure the given segment correct to the nearest A) inch B) $\frac{1}{2}$ inch C) $\frac{1}{4}$ inch D) $\frac{1}{8}$ inch



Answer: $\overline{AB}$ A) 1" B) $1\frac{1''}{2}$ or $\frac{3''}{2}$ C) $\frac{5''}{4}$ or $1\frac{1''}{4}$ D) $\frac{10''}{8}$ or $2\frac{2''}{8}$

ITEM 2

Measure the given segment correct to the nearest A) inch B) $\frac{1}{2}$ inch C) $\frac{1}{4}$ inch D) $\frac{1}{8}$ inch



Answer: $\overline{PQ}$ A) 2" B) $\frac{5''}{2}$ or $2\frac{1''}{2}$ C) $\frac{10''}{4}$ or $2\frac{2''}{4}$ D) $\frac{20''}{8}$ or $2\frac{4''}{8}$

ITEM 3

Objective 125 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Measurement

SUB-CATEGORY: Area-Perimeter-Volume--Selecting Units

OBJECTIVE: Given applications of area, perimeter, or volume and the following kinds of measurement: linear, square, cubic, the student will select the type of unit that would be used in solving the problem.

SAMPLE ITEM:

In the space provided write the letter of the type of unit you would use in solving each problem.

L = Linear S = Square C = Cubic

_____A) Amount of air in a room.

_____B) Area of a floor.

_____C) Amount of fencing to go around a back yard.

_____D) Amount of water in a glass.

Answer: C A)

S B)

L C)

C D)

ITEM 1

Objective 126

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Measurement

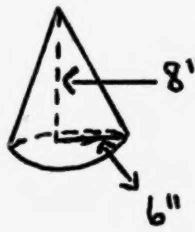
SUB-CATEGORY: Volumes of Cones, Cylinders, Spheres

OBJECTIVE: Given the formulas for the volumes of right circular cylinders, right circular cones, and spheres, and the dimensions of the stated figures, the student will find the volumes.

SAMPLE ITEMS:

Find the volume of the following right circular cone correct to the nearest hundredth.

Right circular cone: $V = \frac{1}{3}\pi r^2 h$

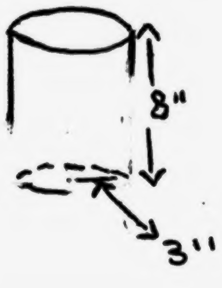


Answer: $\frac{1}{3}\pi(6^2)(8) = 301.44$ cu. in.

ITEM 1

Find the volume of the following right circular cylinder correct to the nearest hundredth.

Right circular cylinder: $V = \pi r^2 h$

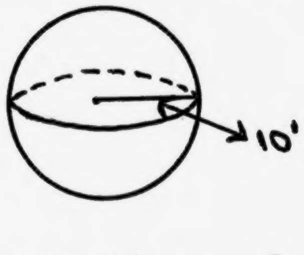


Answer: $\pi(3^2)(8) = 226.08$ cu. in.

ITEM 2

Find the volume of the following sphere correct to the nearest hundredth.

Sphere: $V = \frac{4}{3}\pi r^3$



Answer: $\frac{4}{3}\pi(10^3) = 4186.67$ cu. ft.

ITEM 3

Objective 127

IOX Acceptability Rating: 1

Math

Grade 7-9

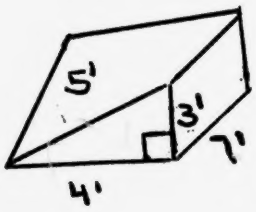
MAJOR CATEGORY: Measurement

SUB-CATEGORY: Surface Area and Volume of Right Triangular Prisms

OBJECTIVE: Given a right triangular prism and its dimensions, the student will find the surface area and volume.

SAMPLE ITEM:

Find the surface area and volume of the following right triangular prism.



Answer: Volume = 42 cu. ft.

Surface Area = 96 sq. ft.

ITEM 1

Objective 128

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Measurement

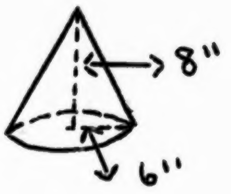
SUB-CATEGORY: Surface Areas of Cylinders, Cones, Spheres

OBJECTIVE: Given the formulas for finding surface areas of right circular cylinders, right circular cones, and spheres, and given dimensions for the said figures, the student will compute the surface areas.

SAMPLE ITEMS:

Find the surface area for the following right circular cone.

Right circular cone: $SA = \pi r(h + r)$

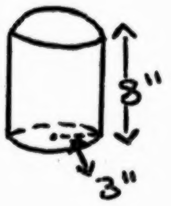


Answer: $\pi(6)(10 + 6) = 301.44$ sq. in.

ITEM 1

Find the surface area for the following right circular cylinder.

Right circular cylinder: $SA = 2\pi r(h + r)$

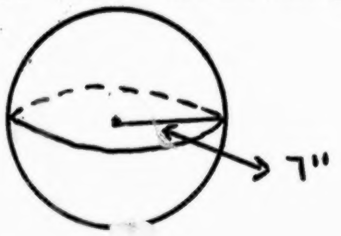


Answer: $2\pi(3)(8 + 3) = 207.24$ sq. in.

ITEM 2

Find the surface area for the following sphere.

Sphere: $SA = 4\pi r^2$



Answer: $4\pi(7^2) = 615.44$ sq. in.

ITEM 3

Math

Objective 129

Grade 7-9

IOX Acceptability Rating: 1

MAJOR CATEGORY: Measurement

SUB-CATEGORY: Irregular Figures

OBJECTIVE: Given a diagram of an irregular figure and the necessary measures, the student will find the area.

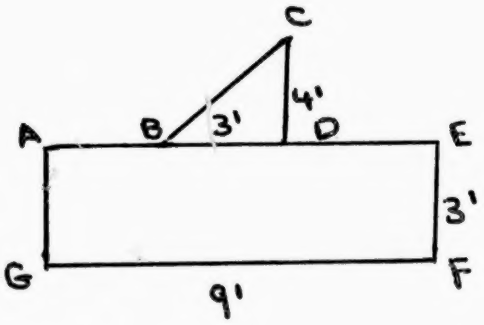
SAMPLE ITEM:

Find the area of each of the following.

A) BCD

B) AEFG

C) The total figure



Answer: A) 6 sq. ft.

B) 27 sq. ft.

C) 33 sq. ft.

ITEM 1

Objective 130

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Measurement

SUB-CATEGORY: Changing to Related Units

OBJECTIVE: Given a square or a cubic measure, the student will change the measure to an indicated equivalent measure.

SAMPLE ITEMS:

Find the corresponding measure for the following.

2 sq. ft. = _____ sq. in.

Answer: 288 sq. in.

ITEM 1

Find the corresponding measure for the following.

27 sq. ft. = _____ sq. yd.

Answer: 3 sq. yd.

ITEM 2

Find the corresponding measure for the following.

_____ cu. in. = 1 cu. ft.

Answer: 1728 cu. in.

ITEM 3

Find the corresponding measure for the following.

27 cu. ft. = _____ cu. yd.

Answer: 1 cu. yd.

ITEM 4

Objective 131 Math

IOX Acceptability Rating: 1 Grade 7-9

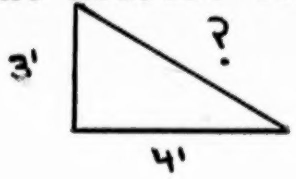
MAJOR CATEGORY: Measurement

SUB-CATEGORY: Pythagorean Relation--Pythagorean Theorem

OBJECTIVE: Given a right triangle and the measurements of two of the three sides, the student will find the measure of the third side by using the Pythagorean Theorem.

SAMPLE ITEMS:

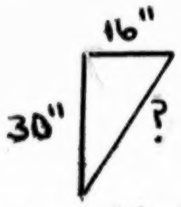
Find the missing measure in the following right triangle by using the Pythagorean Theorem. State your answer to the nearest tenth.



Answer: 5.0'

ITEM 1

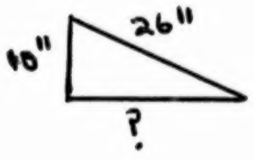
Find the missing measure in the following right triangle by using the Pythagorean Theorem. State your answer to the nearest tenth.



Answer: 34.0"

ITEM 2

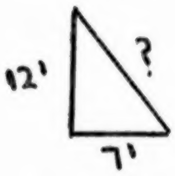
Find the missing measure in the following right triangle by using the Pythagorean Theorem. State your answer to the nearest tenth.



Answer: 24.0"

ITEM 3

Find the missing measure in the following right triangle by using the Pythagorean Theorem. State your answer to the nearest tenth.



Answer: 13.9'

ITEM 4

Objective 132

IOX Acceptability Rating: 1

Math

Grade 7-9

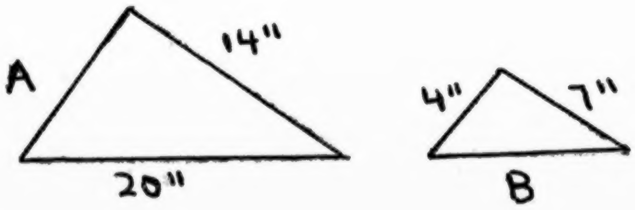
MAJOR CATEGORY: Measurement

SUB-CATEGORY: Similar Triangles

OBJECTIVE: Given a pair of similar triangles, the student will find the measures of the angles and the sides by using the relationships of corresponding sides and corresponding angles.

SAMPLE ITEMS:

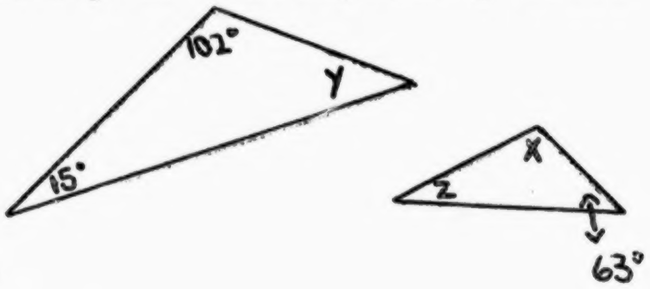
Find the missing measures in the following similar triangles using the relationship of corresponding sides and corresponding angles.



Answer: A = 8"
B = 10"

ITEM 1

Find the missing measures in the following similar triangles using the relationship of corresponding sides and corresponding angles.



Answer: X = 102°
Y = 63°
Z = 15°

ITEM 2

Objective 133

IOX Acceptability Rating: 1

Math

Grade 7-9

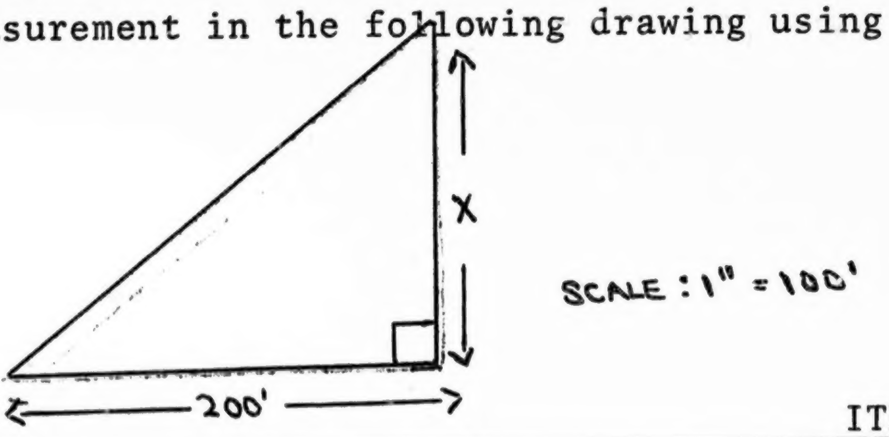
MAJOR CATEGORY: Measurement

SUB-CATEGORY: Indirect Measurements--Scale Drawing

OBJECTIVE: Given a scale drawing of a figure and the scale used to make the drawing, and a ruler, the student will find the missing measurement.

SAMPLE ITEMS:

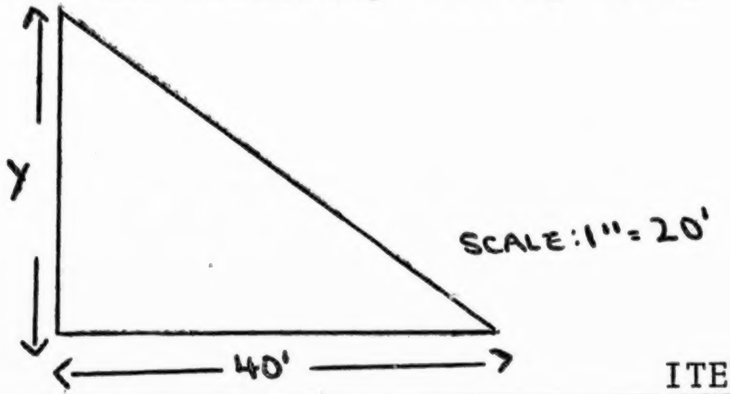
Find the missing measurement in the following drawing using the scale given.



Answer: x = 150'

ITEM 1

Find the missing measurement in the following drawing using the scale given.



Answer: y = 30'

ITEM 2

Objective 134 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Measurement

SUB-CATEGORY: Indirect Measurement--Similar Triangles

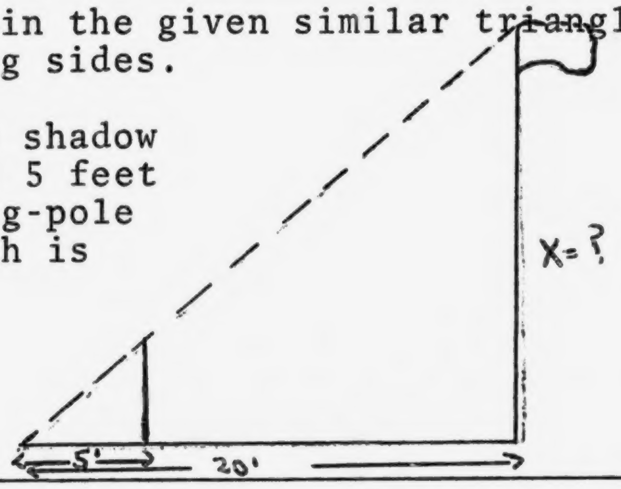
OBJECTIVE: Given a pair of similar triangles or sufficient information to draw a pair of similar triangles and using the relationship of the ratio of the corresponding sides, the student will find the missing measures.

SAMPLE ITEMS:

Find the missing measure in the given similar triangles using the ratio of corresponding sides.

At the same time that the shadow of a 6-foot fence post is 5 feet long, the shadow of a flag-pole is 20 feet long. How high is the flag-pole?

Answer: x = 24 ft.

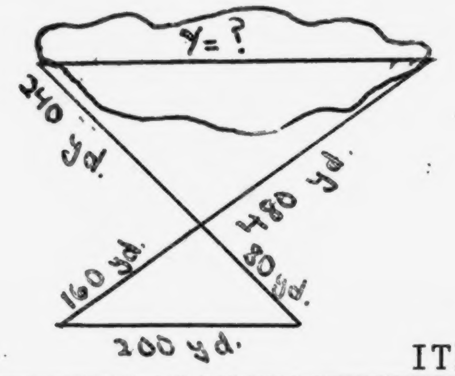


ITEM 1

Find the missing measure in the given similar triangles using the ratio of corresponding sides.

Find the distance AB across the swamp by using the ratio of corresponding sides of the similar triangles.

Answer: y = 600 yd.



ITEM 2

Objective 135

IOX Acceptability Rating: 1

Math

Grade 7-9

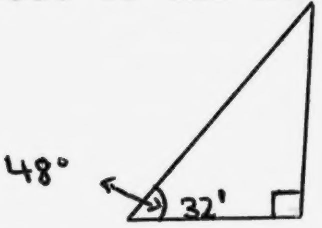
MAJOR CATEGORY: Measurement

SUB-CATEGORY: Indirect Measurement Using Sine, Cosine, and Tangent Ratios

OBJECTIVE: Given a triangle with one angle and one side known and a table of Sine, Cosine, and Tangent values, the student will find the missing measure by using the correct trigonometric ratio.

SAMPLE ITEMS:

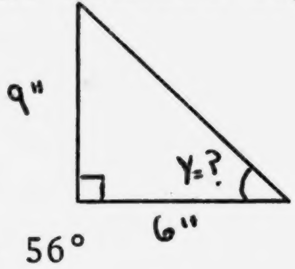
Find the missing measure in the following triangle by using the correct trigonometric ratio. Give answer correct to the nearest tenth.



Answer: x = 35.5'

ITEM 1

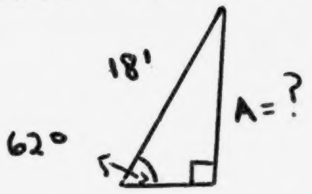
Find the missing measure in the following triangle by using the correct trigonometric ratio. Give answer correct to the nearest degree.



Answer: y = 56°

ITEM 2

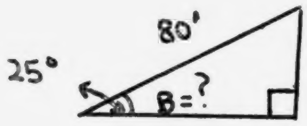
Find the missing measure in the following triangle by using the correct trigonometric ratio. Give answer correct to the nearest tenth.



Answer: a = 15.9'

ITEM 3

Find the missing measure in the following triangle by using the correct trigonometric ratio. Give answer correct to the nearest tenth.



Answer: B = 72.5'

ITEM 4

Objective 136 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Measurement

SUB-CATEGORY: Angles of Elevation and Depression

OBJECTIVE: Given a drawing containing angles of elevation and depression, the student will identify the angles by listing them as elevation or depression.

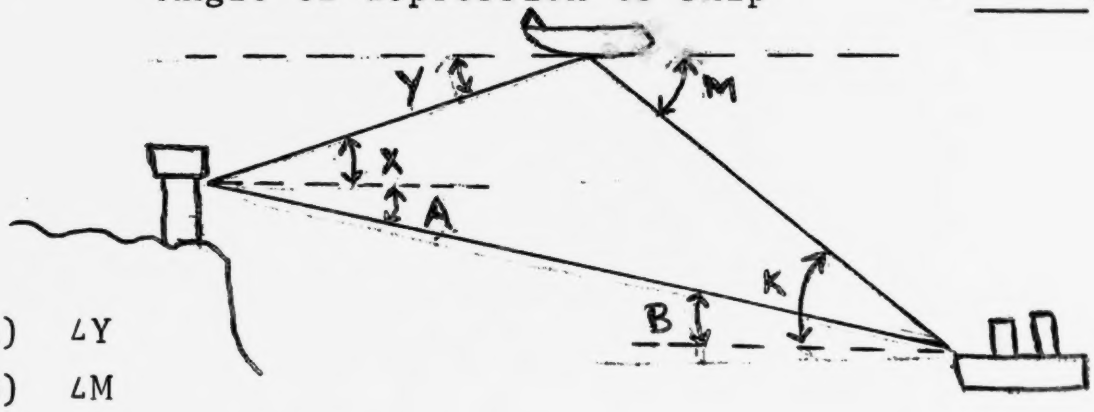
SAMPLE ITEM:

Identify the angles of elevation and depression in the drawing by filling in the blanks given.

From Plane: Angle of depression to lighthouse = _____(A)
Angle of depression to ship = _____(B)

From Ship: Angle of elevation to lighthouse = _____(C)
Angle of elevation to plane = _____(D)

From Lighthouse: Angle of elevation to plane = _____(E)
Angle of depression to ship = _____(F)



Answer: (A) ∠Y
(B) ∠M
(C) ∠B
(D) ∠K
(E) ∠X
(F) ∠A

ITEM 1

Objective 137 — Math

IOX Acceptability Rating: 1 — Grade 7-9

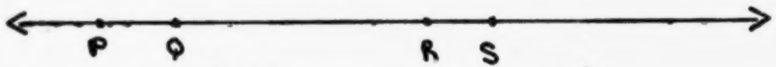
MAJOR CATEGORY: Geometry

SUB-CATEGORY: Union and Intersection of Lines, Line Segments, and Points

OBJECTIVE: Given a line with 4 labeled points and incomplete statements of union or intersection of various lines, points, or line segments, the student will complete the statement to make a true sentence.

SAMPLE ITEM:

Use the diagram given to complete the following statements.



A) $\overline{PQ} \cup \overline{QR} =$ ______

B) $\overline{PQ} \cap \overline{QR} =$ ______

C) $\overline{PQ} \cap \overline{PR} =$ ______

D) $\overline{PR} \cup \overline{SR} =$ ______

E) $\overleftrightarrow{PR} \cap Q =$ ______

F) $\overleftrightarrow{PR} \cup Q =$ ______

G) $\overleftrightarrow{QR} \cup \overline{RS} =$ ______

H) $\overleftrightarrow{QR} \cap \overleftrightarrow{RS} =$ ______

I) $\overleftrightarrow{PQ} \cup \overleftrightarrow{RS} =$ ______

J) $\overrightarrow{QR} \cup \overrightarrow{QP} =$ ______

Answer:
A) $\overline{PR}$
B) Q
C) $\overline{PQ}$
D) $\overline{PS}$
E) Q

F) $\overleftrightarrow{PR}$ or $\overleftrightarrow{PQ}$ or $\overleftrightarrow{QR}$ etc.
G) "
H) "
I) "
J) "
} the line itself

ITEM 1

Objective 138 Math

IOX Acceptability Rating: 1 Grade 7-9

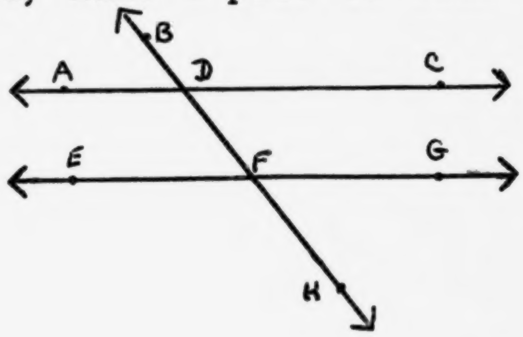
MAJOR CATEGORY: Geometry

SUB-CATEGORY: Line and Angle Relationships

OBJECTIVE: Given a diagram containing at least two parallel lines and a transversal, the student will orally identify by name a pair of complementary, supplementary, vertical, adjacent, congruent, and alternate-interior and alternate-exterior angles.

SAMPLE ITEM:

Orally name a pair of each of the following.



A) Congruent Angles
B) Supplementary Angles
C) Vertical Angles
D) Adjacent Angles
E) Alternate-Interior Angles
F) Alternate-Exterior Angles

Answer: (Answers will vary)

A) ∠ADF, ∠DFG
B) ∠BDC, ∠CDF
C) ∠EFD ∠GFH
D) ∠BDC, ∠CDF
E) ∠ADF, ∠DFG
F) ∠ADB, ∠GFH

ITEM 1

Objective 139 Math

IOX Acceptability Rating: 1 Grade 7-9

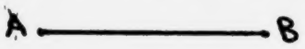
MAJOR CATEGORY: Geometry

SUB-CATEGORY: Constructions--Bisecting a Given Line Segment and/or a Given Angle

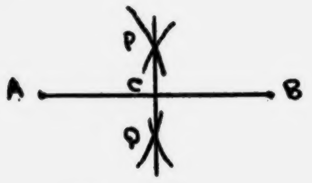
OBJECTIVE: Given a line segment or an angle, a compass, and a straightedge, the student will bisect the given segment and/or the given angle.

SAMPLE ITEMS:

Bisect line segment $\overline{AB}$.



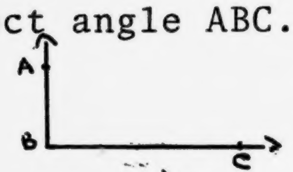
Answer:



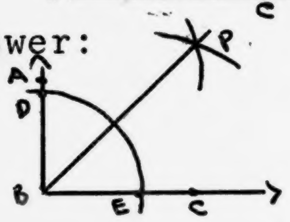
$\overline{AC} = \overline{CB}$

ITEM 1

Bisect angle ABC.



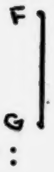
Answer:



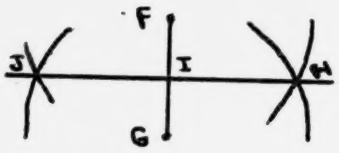
$m\angle ABP = m\angle PBC$

ITEM 2

Bisect line segment $\overline{FG}$



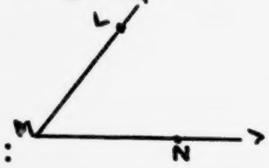
Answer:



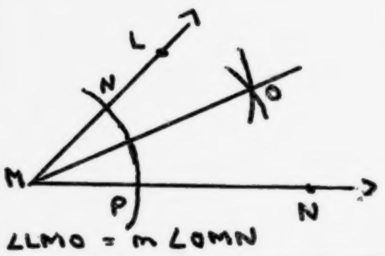
$\overline{FI} = \overline{IG}$

ITEM 3

Bisect angle LMN



Answer:



$m\angle LMO = m\angle OMN$

ITEM 4

Objective 140 | Math

IOX Acceptability Rating: 1 | Grade 7-9

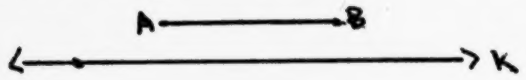
MAJOR CATEGORY: Geometry

SUB-CATEGORY: Construction--Line Segments and Angles Congruent To Given Line Segments and Given Angles

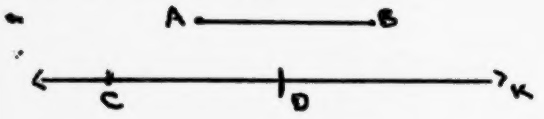
OBJECTIVE: Given lines to work on, a given line segment, a given angle, a compass and a straightedge, the student will construct a line segment congruent to the given segment, and/or an angle congruent to the given angle.

SAMPLE ITEMS:

On line K construct a line segment $\overline{CD}$ congruent to the given line segment $\overline{AB}$.

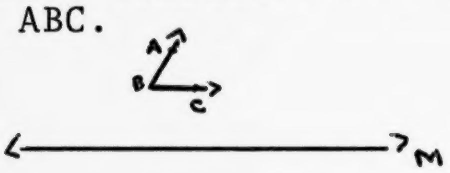


Answer: $\overline{AB} = \overline{CD}$

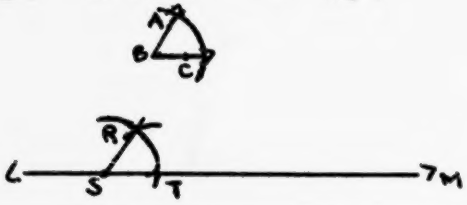


ITEM 1

On line M construct an angle DMF congruent to the given angle ABC.



Answer: m ABC = m RST



ITEM 2

Objective 141

Math

IOX Acceptability Rating: 1

Grade 7-9

MAJOR CATEGORY: Geometry

SUB-CATEGORY: Recognition of Descriptions of Various Polygons or Their Related Space Figure

OBJECTIVE: Given a list of kinds of polygons and their description, the student will match each polygon with its description.

SAMPLE ITEM:

Match each of the polygons in column A with its respective description in column B.

COLUMN A

___1. Polygon
___2. Pentagon
___3. Hexagon
___4. Octagon
___5. Triangle
___6. Quadrilateral
___7. Regular Polygon
___8. Decagon

COLUMN B

A) a five-sided polygon
B) a six-sided polygon
C) an eight-sided polygon
D) a four-sided polygon
E) polygon with equal sides and equal angles
F) a three-sided polygon
G) any broken-line closed figure with no points of intersection except the end points of the segments
H) an 11-sided polygon
I) a 10-sided polygon
J) polygon with opposite sides parallel

Answer:
1. G
2. A
3. B
4. C
5. F
6. D
7. E
8. I

ITEM 1

Objective 142 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Geometry

SUB-CATEGORY: Recognition of Symbols for $\overrightarrow{\text{Ray}}$, $\overset{\circ\!\!\longrightarrow}{\text{Half-Line}}$, $\overline{\text{Line Segment}}$, $\overset{\cdot}{\text{Point}}$, $\overleftrightarrow{\text{Line}}$, $\overset{<}{\text{Angle}}$

OBJECTIVE: Given a list of terms and their symbolic representation, the student will match the term with the correct representation.

SAMPLE ITEM:

Match each of the terms in the first column with its symbolic representation in the second column.

___1. Ray A) $\overleftrightarrow{CD}$
___2. Segment B) $\cdot P$
___3. Line C) $\overrightarrow{AB}$
___4. Point D) $\overline{EF}$
___5. Angle E) $\overset{\circ\!\!\longrightarrow}{AB}$
___6. Half-Line F) $\angle ABC$
G) $\triangle PQR$

Answer: 1. C
2. D
3. A
4. B
5. F
6. E

ITEM 1

Objective 143

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Geometry

SUB-CATEGORY: Point, Line, Plane

OBJECTIVE: Given incomplete statements of relationship among point, line, and plane, and possible answers of 0, 1, 2, 3, or infinite numbers of points on a line, the student will complete the statement to make a true sentence.

SAMPLE ITEMS:

In the following sentence fill in the blank with the correct number (1, 2, 3, or infinite) to make the sentence true.

In space, three points not on the same line lie in _____ plane(s).

Answer: 1

ITEM 1

In the following sentence fill in the blank with the correct number (1, 2, 3, or infinite) to make the sentence true.

A line and a point not on the line lie in _____ plane(s).

Answer: 1

ITEM 2

In the following sentence fill in the blank with the correct number (1, 2, 3, or infinite) to make the sentence true.

A line is determined by _____ points.

Answer: 2

ITEM 3

In the following sentence fill in the blank with the correct number (1, 2, 3, or infinite) to make the sentence true.

In space, three collinear points lie in _____ plane(s).

Answer: infinite

ITEM 4

Objective 144 — Math

IOX Acceptability Rating: 1 — Grade 7-9

MAJOR CATEGORY: Geometry

SUB-CATEGORY: Drawing Various Types of Triangles--Obtuse, Right, Acute, Equiangular, Scalene, Equilateral, Isosceles

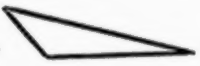
OBJECTIVE: Given a list of various types of triangles according to angles or according to sides, the student will draw an example of each.

SAMPLE ITEM:

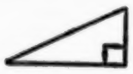
In the space at the right of each of the following draw a figure which clearly exemplifies each of the following types of triangles.

1. Obtuse triangle
2. Right triangle
3. Acute triangle
4. Eqiangular triangle
5. Scalene triangle
6. Equilateral triangle
7. Isosceles triangle

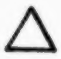
Answer: 1.



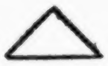
2.



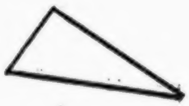
3.



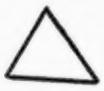
4.



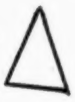
5.



6.



7.



ITEM 1

Math

Objective 145

Grade 7-9

IOX Acceptability Rating: 1

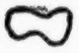
MAJOR CATEGORY: Geometry

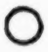
SUB-CATEGORY: Classification of Plane Figures--Closed Curve, Circle, Triangle, Rectangle, Square, Parallelogram, Ellipse, Rhombus, Trapezoid

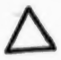
OBJECTIVE: Given a set of polygonal figures and their respective names, the student will match the name with the correct figure.

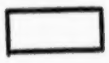
SAMPLE ITEM:

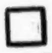
Match each plane figure with any name in the right column which may be used to describe it using two or more classifications where more than one applies.

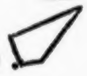
___1 

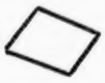
___2. 

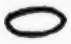
___3. 

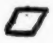
___4. 

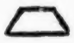
___5. 

___6 

___7. 

___8. 

___9. 

___10. 

A) Circle
B) Quadrilateral With No Parallel Sides
C) Rhombus
D) Trapezoid
E) Ellipse
F) Pentagon
G) Triangle
H) Parallelogram
I) Closed Curve
J) Hexagon
K) Rectangle
L) Square

Answer:
1. I
2. A, I
3. G, I
4. K, H, I
5. C, L, K, H, I
6. B, I
7. H, I
8. E, I
9. C, H, I
10. D, I

ITEM 1

Objective 146 Math

IOX Acceptability Rating: 1 Grade 7-9

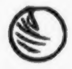
MAJOR CATEGORY: Geometry

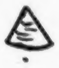
SUB-CATEGORY: Recognition of Solid Figures--Sphere, Cone, Pyramid, Cube, Rectangular Prism, Cylinder, Triangular Prism

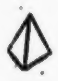
OBJECTIVE: Given a pictorial representation and a list of solid figures, the student will identify each by matching.

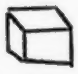
SAMPLE ITEM:

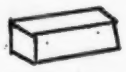
Match the figure in the first column with the correct term in the second column.

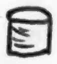
___1. 

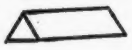
___2. 

___3. 

___4. 

___5. 

___6. 

___7. 

A) Oblique Rectangular Prism
B) Pyramid
C) Cone
D) Cube
E) Right Triangular Prism
F) Sphere
G) Oblique Cylinder
H) Right Circular Cylinder

Answer: 1. F
2. C
3. B
4. D
5. A
6. H
7. E

ITEM 1

Objective 147 Math

IOX Acceptability Rating: 1 Grade 7-9

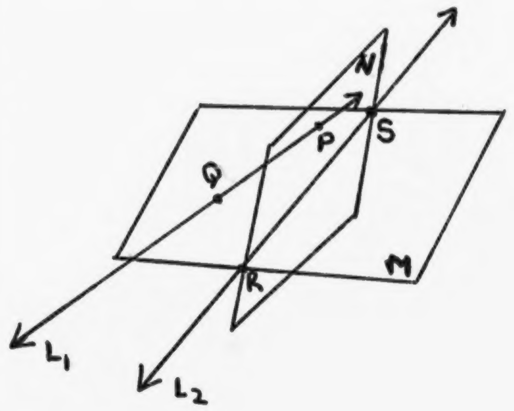
MAJOR CATEGORY: Geometry

SUB-CATEGORY: Intersection of Lines and Planes

OBJECTIVE: Given a diagram illustrating intersection of lines and planes and incomplete sentences relating point, line, and plane, the student will complete each sentence.

SAMPLE ITEM:

Use the diagram to complete the following.



1. Plane M $\cap$ Plane N = _____
2. $L_1 \cap$ Plane N = _____
3. $\overleftrightarrow{QP} \cap$ Plane M = _____
4. $L_1 \cap L_2$ = _____
5. $\overline{PQ} \cap$ Plane N = _____
6. Q $\in$ Plane _____
7. _____ $\subset$ Plane PQR

Answer:
1. L_2 or $\overleftrightarrow{RS}$
2. P
3. Q
4. $\emptyset$ or $\{\}$
5. P
6. M
7. L_1 or $\overleftrightarrow{QP}$

ITEM 1

Objective 148 Math

IOX Acceptability Rating: 1 Grade 7-9

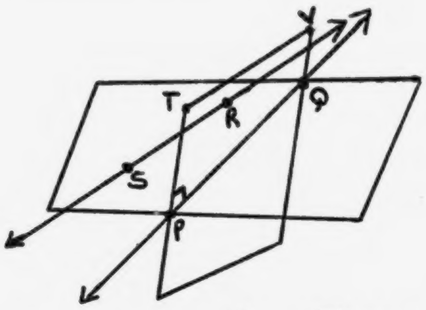
MAJOR CATEGORY: Geometry

SUB-CATEGORY: Classification of Lines--Parallel, Perpendicular, Intersecting, Skew

OBJECTIVE: Given a diagram, a list of types of lines, and a specific pair of lines, the student will identify the pairs of lines as parallel, perpendicular, intersecting, or skew.

SAMPLE ITEM:

Identify each of the following pairs of lines as parallel, perpendicular, skew, or intersecting using two classifications where two apply.



A) $\overleftrightarrow{RS}$ and $\overleftrightarrow{PQ}$

B) $\overleftrightarrow{PQ}$ and $\overleftrightarrow{PT}$

C) $\overleftrightarrow{QV}$ and $\overleftrightarrow{PT}$

Answer: A) Skew (different planes and not parallel)

B) Perpendicular and Intersecting

C) Parallel

ITEM 1

Objective 149

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Geometry

SUB-CATEGORY: Half Planes

OBJECTIVE: Given a line AB separating a plane into two half planes and a series of questions about the three sets of points which are formed (line, set of points on one side of the line, set of points on the other side), the student will write the correct answers.

SAMPLE ITEM:

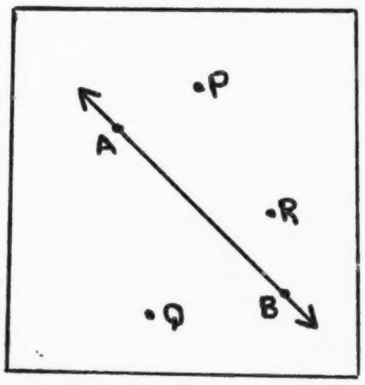
Write the answers to the following.

1. Does $\overline{PQ}$ intersect $\overleftrightarrow{AB}$?

2. Does $\overline{PR}$ intersect $\overleftrightarrow{AB}$?

3. Does $\overline{RQ}$ intersect $\overleftrightarrow{AB}$?

4. $\overleftrightarrow{AB}$ separates the plane into 3 sets of points. Name them.



Answer: 1. Yes

2. No

3. Yes

4. a. Line AB
   b. The half plane on the P-side of $\overleftrightarrow{AB}$
   c. The half plane on the Q-side of $\overleftrightarrow{AB}$

ITEM 1

Objective 150

IOX Acceptability Rating: 1

Math

Grade 7-9

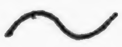
MAJOR CATEGORY: Geometry

SUB-CATEGORY: Curves

OBJECTIVE: Given a curve, the student will state whether it is just a curve, a simple closed curve, or a closed curve which is not simple.

SAMPLE ITEMS:

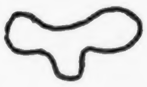
Write C for curve, SCC for simple closed curve, and CC$\overline{S}$ for closed curve which is not simple. Use the answer that most completely describes the figure.



Answer: C

ITEM 1

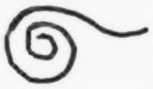
Write C for curve, SCC for simple closed curve, and CC$\overline{S}$ for closed curve which is not simple. Use the answer that most completely describes the figure.



Answer: SCC

ITEM 2

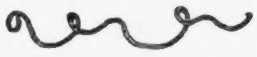
Write C for curve, SCC for simple closed curve, and CC$\overline{S}$ for closed curve which is not simple. Use the answer that most completely describes the figure.



Answer: C

ITEM 3

Write C for curve, SCC for simple closed curve, and CC$\overline{S}$ for closed curve which is not simple. Use the answer that most completely describes the figure.



Answer: CC$\overline{S}$

ITEM 4

Objective 151 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Geometry

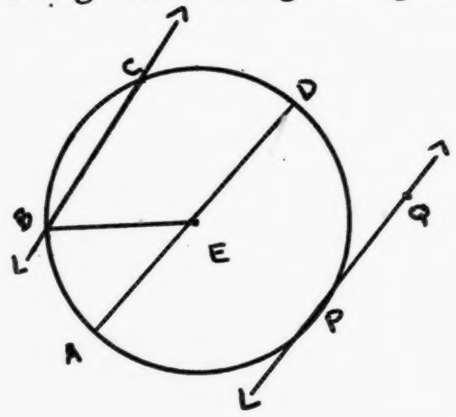
SUB-CATEGORY: Circles, Parts of

OBJECTIVE: Given a diagram of a circle, the student will name the center, an arc, a chord, a radius, a diameter, a semicircle, a tangent, and a secant.

SAMPLE ITEM:

Name one of each of the following using the diagram given.

1. center
2. arc
3. chord
4. radius
5. diameter
6. semi-circle
7. tangent
8. secant



Answer: 1. • E

2. BC

3. $\overline{BC}$, $\overline{AD}$

4. $\overline{BE}$, $\overline{AE}$, $\overline{ED}$

5. $\overline{AD}$

6. APD, ABCD

7. PQ

8. BC

ITEM 1

Objective 152 Math

IOX Acceptability Rating: 1 Grade 7-9

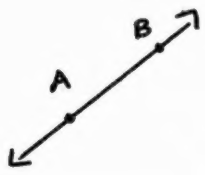
MAJOR CATEGORY: Geometry

SUB-CATEGORY: Vertical, Oblique, Horizontal Lines

OBJECTIVE: Given diagrams of lines, the student will label each as vertical, horizontal, or oblique in relation to the bottom of the page.

SAMPLE ITEMS:

In the space provided label the line as vertical, horizontal, or oblique in relation to the bottom of the page.

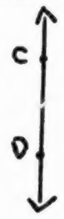


____

Answer: $\overleftrightarrow{AB}$ Oblique

ITEM 1

In the space provided label the line as vertical, horizontal, or oblique in relation to the bottom of the page.

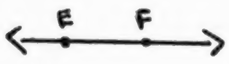


____

Answer: $\overleftrightarrow{CD}$ Vertical

ITEM 2

In the space provided label the line as vertical, horizontal, or oblique in relation to the bottom of the page.

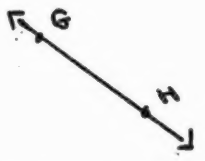


____

Answer: $\overleftrightarrow{EF}$ Horizontal

ITEM 3

In the space provided label the line as vertical, horizontal, or oblique in relation to the bottom of the page.



____

Answer: $\overleftrightarrow{GH}$ Oblique

ITEM 4

Objective 153 Math

IOX Acceptability Rating: 1 Grade 7-9

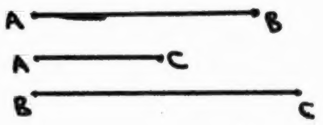
MAJOR CATEGORY: Geometry

SUB-CATEGORY: Construction--Triangles

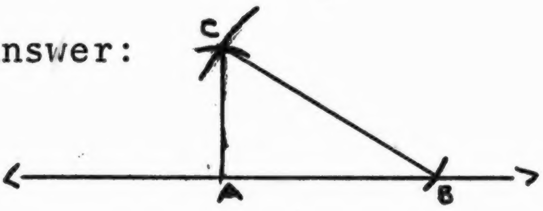
OBJECTIVE: Given the measures of three line segments or two line segments and the included angle, or two angles and the included side, a compass and a straight edge, the student will construct a triangle.

SAMPLE ITEMS:

Use the given line segments to construct a triangle.

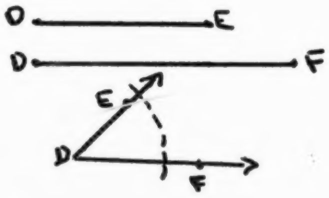


Answer:

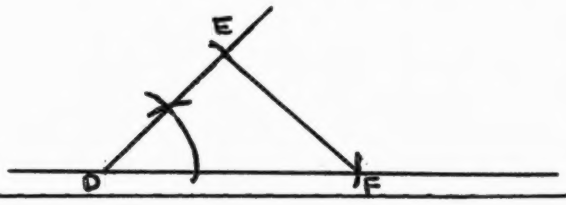


ITEM 1

Use the given line segment and angles to construct a triangle.



Answer:



ITEM 2

Objective 154 Math

IOX Acceptability Rating: 1 Grade 7-9

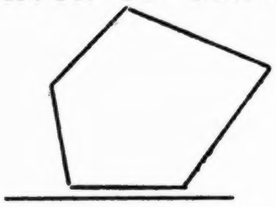
MAJOR CATEGORY: Geometry

SUB-CATEGORY: Convex, Concave Polygons

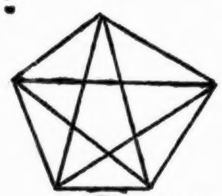
OBJECTIVE: Given a series of convex and concave polygons and a straightedge, the student will draw their diagonals and label each as convex or concave.

SAMPLE ITEMS:

Draw all diagonals of the following polygon and label it as convex or concave.



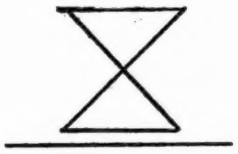
Answer:



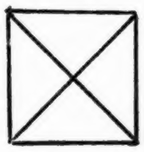
Convex

ITEM 1

Draw all diagonals of the following polygon and label it as convex or concave.



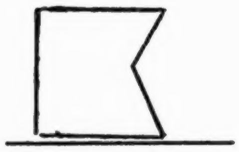
Answer:



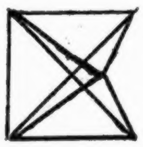
Concave

ITEM 2

Draw all diagonals of the following polygon and label it as convex or concave.



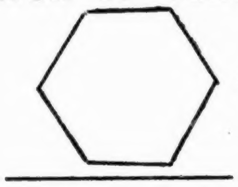
Answer:



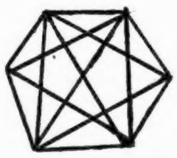
Concave

ITEM 3

Draw all diagonals of the following polygon and label it as convex or concave.



Answer:



Convex

ITEM 4

Objective 155 Math

IOX Acceptability Rating: 1 Grade 7-9

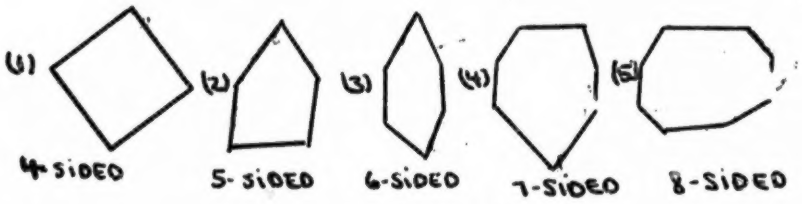
MAJOR CATEGORY: Geometry

SUB-CATEGORY: Convex Polygons

OBJECTIVE: Given a series of convex polygons and a straightedge, the student will draw the diagonals and develop the general formula for the number of diagonals in an n-sided polygon.

SAMPLE ITEM:

Part I: How many diagonals are there in each of the following polygons?



Part II: Develop a general formula for the number of diagonals in an n-sided polygon.

Answer: Part I

4-sided - 2 diagonals
5-sided - 5 diagonals
6-sided - 9 diagonals
7-sided - 14 diagonals
8-sided - 20 diagonals

Part II

$\frac{n\ (n-3)}{2}$ Sample: $\frac{8\ (8-3)}{2} = \frac{40}{2} = 20$

ITEM 1

Objective 156

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Geometry

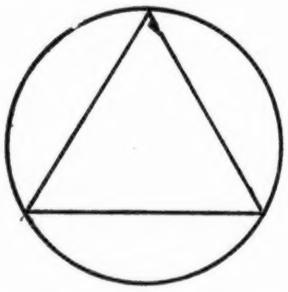
SUB-CATEGORY: Construction--Regular Polygons

OBJECTIVE: Given a protractor and a compass, the student will draw any size circle and inscribe a regular polygon of n sides within the circle.

SAMPLE ITEMS:

Draw a circle and inscribe an equilateral triangle.

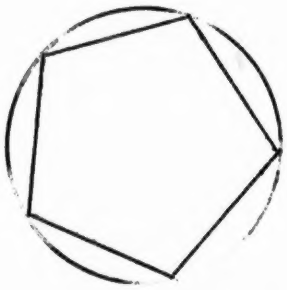
Answer:



ITEM 1

Draw a circle and inscribe a regular pentagon.

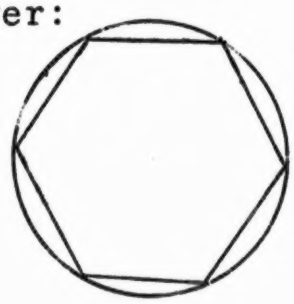
Answer:



ITEM 2

Draw a circle and inscribe a regular hexagon.

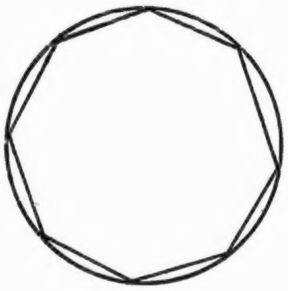
Answer:



ITEM 3

Draw a circle and inscribe a regular octagon.

Answer:



ITEM 4

Objective 157

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Geometry

SUB-CATEGORY: Construction--Circles

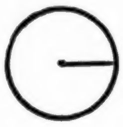
OBJECTIVE: Given a compass, the student will draw a circle using a given radius.

SAMPLE ITEMS:

Draw a circle with the given radius.

$\frac{1''}{4}$

Answer:

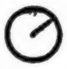


ITEM 1

Draw a circle with the given radius.

$\frac{1''}{8}$

Answer:

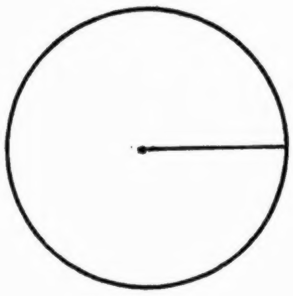


ITEM 2

Draw a circle with the given radius.

$\frac{5''}{8}$

Answer:

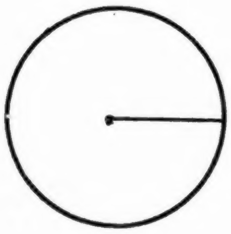


ITEM 3

Draw a circle with the given radius.

$\frac{1''}{2}$

Answer:



ITEM 4

Objective 158 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Geometry

SUB-CATEGORY: Terms--Parallel, Coplaner, Collinear, Coincident

OBJECTIVE: Given a diagram of a 3-dimensional figure and incomplete sentences, the student will complete the sentences with the required information.

SAMPLE ITEM:

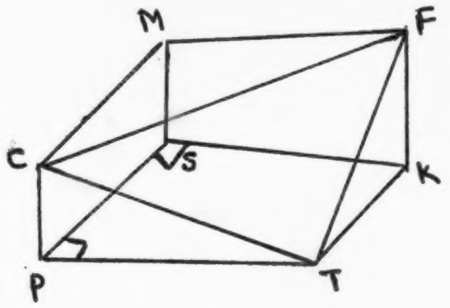
Make the following into true statements by replacing the _____ by the names of figures determined by points represented by corners of the object pictured.

1. $\overleftrightarrow{TF}$ and _____ are coplaner lines.

2. M, F, and _____ are coplaner points.

3. Line _____ is parallel to $\overleftrightarrow{PT}$.

4. Plane MSK is coincident with _____.



Answer:

1. $\overleftrightarrow{CT}$ or $\overleftrightarrow{CF}$

2. K or S or C

3. $\overleftrightarrow{SK}$ or $\overleftrightarrow{MF}$

4. MFK

ITEM 1

Objective 159 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Geometry

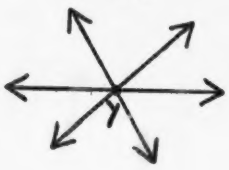
SUB-CATEGORY: Concurrent

OBJECTIVE: Given diagrams of concurrent and non-concurrent lines and planes, the student will identify those which are concurrent.

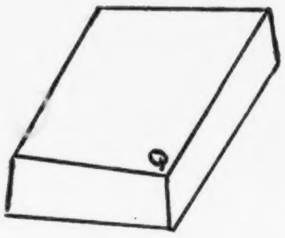
SAMPLE ITEM:

Place an X by those diagrams which show 3 concurrent lines or planes.

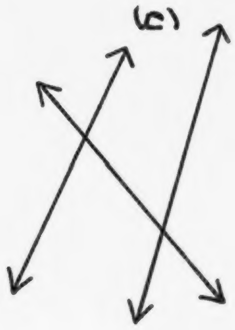
(A)



(B)



(C)



Answer: A) X

B) X

C) No

ITEM 1

Objective 160

IOX Acceptability Rating: 1

Math

Grade 7-9

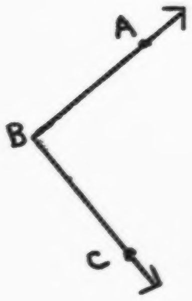
MAJOR CATEGORY: Geometry

SUB-CATEGORY: Angles

OBJECTIVE: Given a picture of an angle, the student will identify the vertex, the rays which form the sides, and mark a point on the interior and a point on the exterior of the angle, and name the angle three ways.

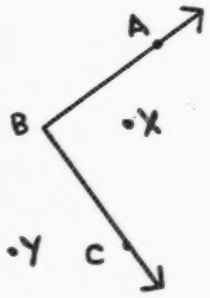
SAMPLE ITEM:

Answer the following questions about the given angle.



1. Name the angle 3 ways.
2. Name the vertex of the angle.
3. Name 2 rays which unite to form the angle.
4. Mark point X in the interior.
5. Mark point Y in the exterior.

Answer: 1. ABC, CBA, B
2. B
3. $\overrightarrow{BA}$, $\overrightarrow{BC}$
4. (see angle)
5. (see angle)



ITEM 1

Objective 161

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Geometry

SUB-CATEGORY: Triangles

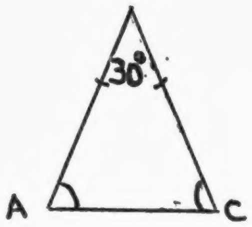
OBJECTIVE: Given an isosceles triangle and the measure of one of the angles, the student will compute the measure of the other angles.

SAMPLE ITEMS:

Name the measure of ∠A and ∠C.

∠A =

∠C =



Answer: ∠A = 75°

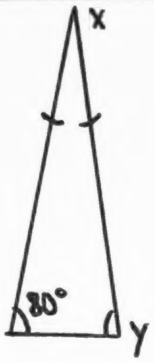
∠C = 75°

ITEM 1

Name the measure of ∠X and ∠Y.

∠X =

∠Y =



Answer: ∠X = 20°

∠Y = 80°

ITEM 2

Objective 162

IOX Acceptability Rating: 1

Math

Grade 7-9

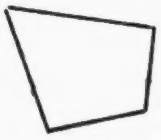
MAJOR CATEGORY: Geometry

SUB-CATEGORY: Symmetry

OBJECTIVE: Given a figure, the student will state whether or not the given figure has one or more lines or axes of symmetry and draw each line or axis of symmetry.

SAMPLE ITEMS:

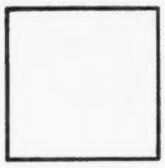
State whether the given figure has one or more lines or axes of symmetry. Draw each line or axis of symmetry.



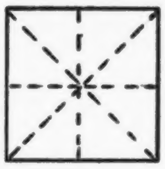
Answer: None

ITEM 1

State whether the given figure has one or more lines or axes of symmetry. Draw each line or axis of symmetry.

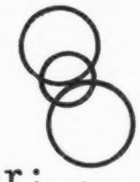


Answer: 4

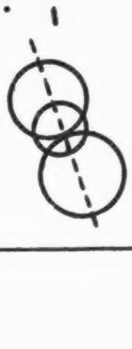


ITEM 2

State whether the given figure has one or more lines or axes of symmetry. Draw each line or axis of symmetry.

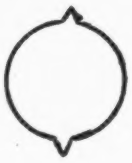


Answer:

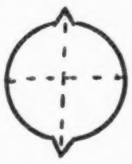


ITEM 3

State whether the given figure has one or more lines or axes of symmetry. Draw each line or axis of symmetry.



Answer: 2



ITEM 4

Objective 163 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Geometry

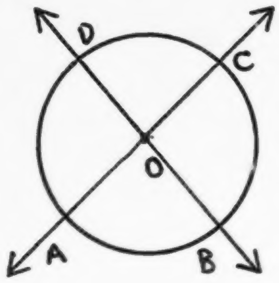
SUB-CATEGORY: Symmetry

OBJECTIVE: Given a geometric figure having more than one axis of symmetry and a set of questions on symmetry, the student will answer the question.

SAMPLE ITEM:

Using the figure to the right, answer the following questions.

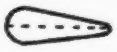
1. Name the lines of symmetry.
2. What is the point of symmetry.
3. Can a figure be symmetric about a line and not about a point.
4. Give an example of question #3.



Answer: 1. $\overleftrightarrow{AC}$, $\overleftrightarrow{BD}$

2. 0

3. Yes

4. 

ITEM 1

Objective 164

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Geometry

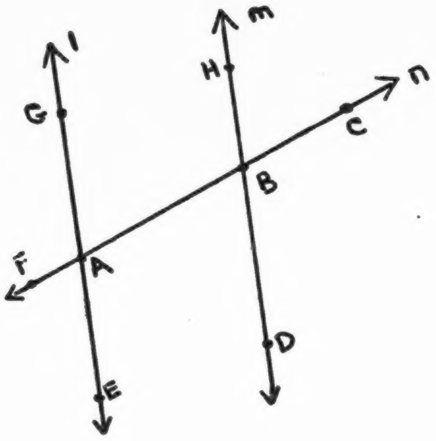
SUB-CATEGORY: Rays

OBJECTIVE: Given a set of parallel lines cut by a transversal and a set of statements about rays, the student will select the true statements.

SAMPLE ITEM:

Tell which of the following statements are true and which are false.

1. $\overrightarrow{AG}$ and $\overrightarrow{BH}$ are parallel rays.
2. $\overrightarrow{AG}$ and $\overrightarrow{BD}$ are opposite rays.
3. $\overrightarrow{AE}$ and $\overrightarrow{EG}$ are collinear rays.
4. $\overrightarrow{AF}$ and $\overrightarrow{BC}$ are opposite rays.



Answer: 1. True

2. False

3. True

4. False

ITEM 1

Objective 165

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Geometry

SUB-CATEGORY: One-, Two-, Three- Dimensional Figures

OBJECTIVE: Given a series of objects commonly found around the home and school, the student will classify the given figures as 1-dimensional, 2-dimensional, or 3-dimensional.

SAMPLE ITEM:

Classify according to 1-dimensional, 2-dimensional, 3-dimensional.

A) a piece of paper
B) pane of glass
C) ray of sunlight
D) telephone pole
E) air in a balloon
F) string

Answer:
A) 2-D
B) 2-D
C) 1-D
D) 3-D
E) 3-D
F) 1-D

ITEM 1

Objective 166 | Math

IOX Acceptability Rating: 1 | Grade 7-9

MAJOR CATEGORY: Geometry

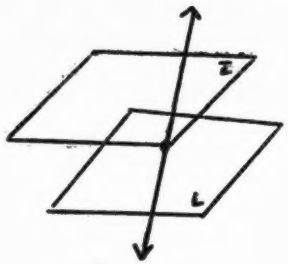
SUB-CATEGORY: Perpendicular and Parallel Planes

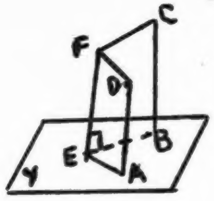
OBJECTIVE: Given a set of planes, some perpendicular to one another and some parallel to one another and a set of questions about the properties of perpendicular and parallel planes, the student will answer the questions.

SAMPLE ITEM:

Use the diagrams given to answer the following questions.

1. Name 2 parallel planes _____, _____.
2. EF is perpendicular to plane _____.
3. EF is perpendicular to lines _____ and _____.
4. If a line is perpendicular to 2 intersecting lines in a plane, is it perpendicular to the plane?





Answer:
1. Z, L
2. Y or BEA
3. $\overleftrightarrow{EB}$, $\overleftrightarrow{AE}$
4. Yes

ITEM 1

Objective 167 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Geometry

SUB-CATEGORY: Identification of Models of Pyramids and Prisms

OBJECTIVE: Given models of prisms and pyramids, and a list of names, the student will match the model to the name which most completely describes it.

SAMPLE ITEM:

Match the name to the correct picture.
(Models available in classroom)

1) right hexagonal prism
2) right triangular prism
3) parallelepiped
4) right rectangular prism
5) cube
6) square pyramid
7) pentagonal pyramid

Answer: Answers will vary with models given.

ITEM 1

Objective 168

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Geometry

SUB-CATEGORY: Optical Illusions

OBJECTIVE: Given a series of optical illusions, the student will tell orally why one figure looks longer or larger than another.

SAMPLE ITEM:

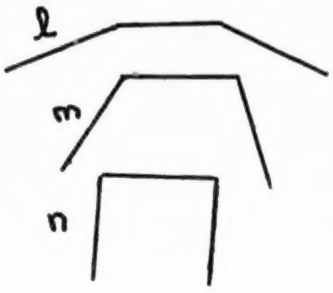
Orally answer the following questions.

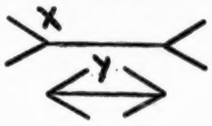
A) Why does line n look shorter?

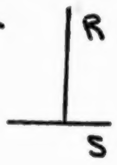
B) Why does line x look longer?

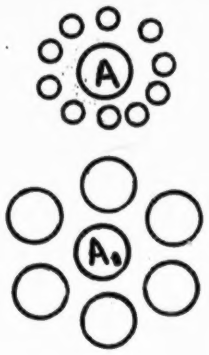
C) Why does line r look longer?

D) Which circle looks larger, A or A_1? Why?









Answer: Answers will vary.

ITEM 1

Objective 169 Math

IOX Acceptability Rating: 1 Grade 7-9

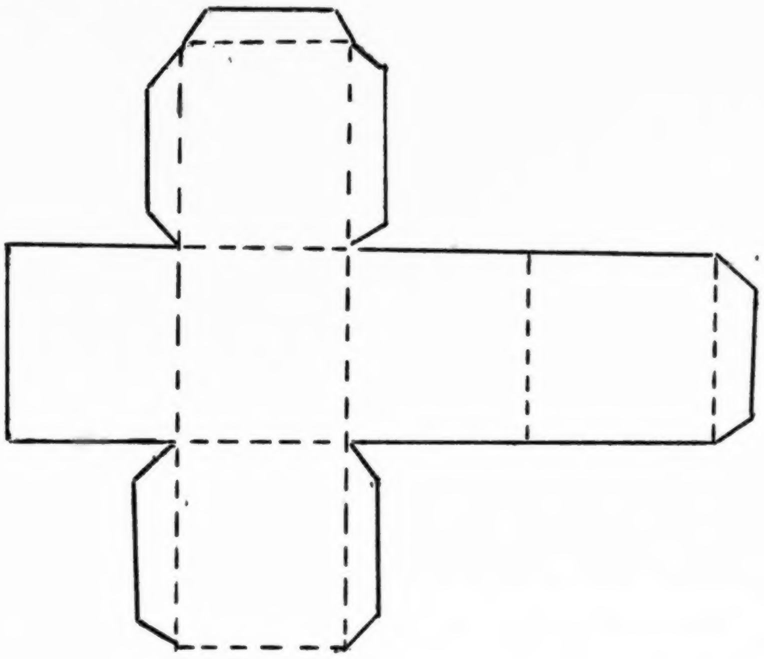
MAJOR CATEGORY: Geometry

SUB-CATEGORY: Prisms--Models

OBJECTIVE: Given a pattern for a model of a cube, a right triangular prism, or a parallelepiped, a piece of heavy paper, scissors, glue, and a ruler, the student will copy the pattern on heavy paper and construct the 3-dimensional model for one of the given figures.

SAMPLE ITEM:

Construct a 3-dimensional model of the cube. Copy the pattern on heavy paper. Cut on the solid lines and fold on the dotted lines. Glue each tab to the inside of the adjoining face.



Answer: The constructed 3-dimensional model.

ITEM 1

Objective 170 Math

IOX Acceptability Rating: 1 Grade 7-9

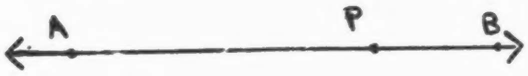
MAJOR CATEGORY: Geometry

SUB-CATEGORY: Construction--Constructing

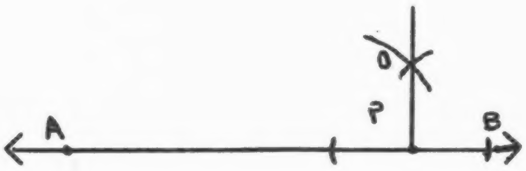
OBJECTIVE: Given a compass, a straightedge, and a point on the given line or a line and a point not on the line, the student will construct a line through the given point perpendicular to the given line.

SAMPLE ITEMS:

Construct a line through point P perpendicular to line AB.



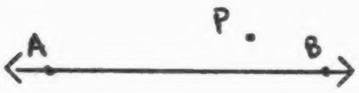
Answer:



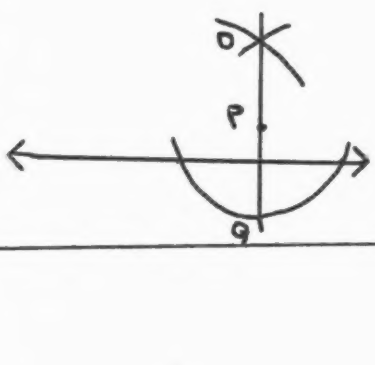
$\overline{PO} \perp \overline{AB}$

ITEM 1

Construct a line through point P perpendicular to line AB.



Answer:



$\overline{OQ} \perp \overline{AB}$

ITEM 2

Objective 171 Math

IOX Acceptability Rating: 1 Grade 7-9

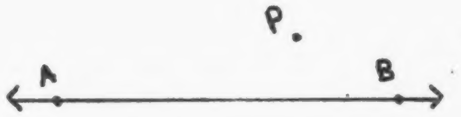
MAJOR CATEGORY: Geometry

SUB-CATEGORY: Construction--Constructing Parallel Lines

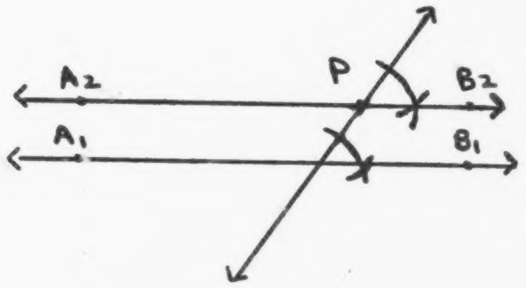
OBJECTIVE: Given a compass, a straightedge, a line and a point not on the line, the student will construct a line through the given point parallel to the given line.

SAMPLE ITEM:

Construct a line through point P parallel to line AB. Draw a transversal line through point P and line AB to help with the construction.



Answer:



$\overleftrightarrow{A_2B_2} \parallel \overleftrightarrow{A_1B_1}$

ITEM 1

Objective 172 Math

IOX Acceptability Rating: 1 Grade 7-9

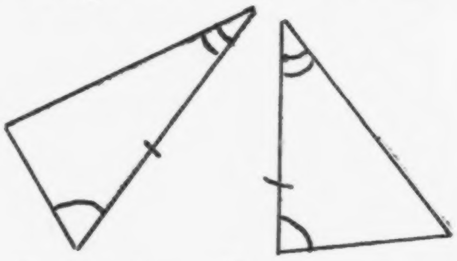
MAJOR CATEGORY: Geometry

SUB-CATEGORY: Congruent Triangles

OBJECTIVE: Given pairs of triangles with congruent sides labeled with strokes and congruent angles labeled with arcs, the student will state whether the triangles are congruent by the Angle-Side-Angle (ASA) rule, the Side-Angle-Side (SAS) rule, or the Side-Side-Side rule.

SAMPLE ITEMS:

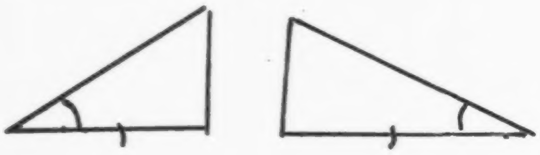
State whether the triangles in the given pair are congruent by ASA as marked.



Answer: Yes

ITEM 1

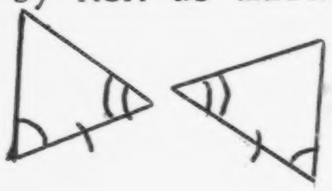
State whether the triangles in the given pair are congruent by ASA as marked.



Answer: Not as marked

ITEM 2

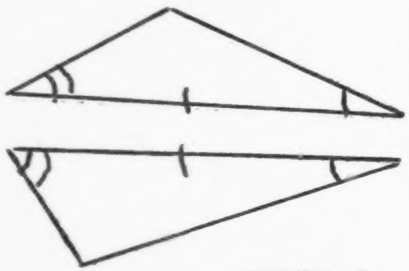
State whether the triangles in the given pair are congruent by ASA as marked.



Answer: Yes

ITEM 3

State whether the triangles in the given pair are congruent by ASA as marked.



Answer: Yes

ITEM 4

Objective 173

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Relations, Functions and Graphs

SUB-CATEGORY: Solution Sets for Number Sets in Two Variables

OBJECTIVE: Given an open number sentence in two variables and a set of ordered pairs, the student will select the ordered pairs which are solutions of the given sentences.

SAMPLE ITEMS:

Select the letter or letters of the ordered pairs which make(s) the sentence true.

$$X = Y + 5$$

a. (-5,0) b. (-1,1) c. (0,-3)
d. (6,1)

Answer: d. (6,1)

ITEM 1

Select the letter or letters of the ordered pairs which make(s) the sentence true.

$$2X + Y = 8$$

a. (3,2) b. (0,8) c. (-3,0)
d. (1,-4)

Answer: a. (3,2) b. (0,8)

ITEM 2

Select the letter or letters of the ordered pairs which make(s) the sentence true.

$$X - Y = 11$$

a. (9,-2) b. (9,0) c. (13,1)
d. (47,36)

Answer: a. (9,-2) d. (47,36)

ITEM 3

Select the letter or letters of the ordered pairs which make(s) the sentence true.

$$X + Y = 12$$

a. (6,5) b. (17,-5) c. (13,-1)
d. (14,2)

Answer: b. (17,-5) c. (13,-1)

ITEM 4

Objective 174

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Relations, Functions and Graphs

SUB-CATEGORY: Table of Solutions and Corresponding Sentences

OBJECTIVE: Given a table of solutions and two numbers sentences, the student will select the one which is related.

SAMPLE ITEMS:

Determine which sentence fits the table and write the letter on the line to the right.

x	2	3	4
y	6	8	10

a. $y=2x + 2$
b. $y=3x - 1$ ________

Answer: a

ITEM 1

Determine which sentence fits the table and write the letter on the line to the right.

x	0	1	2
y	4	3	2

a. $y=4 + x$
b. $y=4 - x$ ________

Answer: b

ITEM 2

Determine which sentence fits the table and write the letter on the line to the right.

x	2	4	6
y	3	4	5

a. $y=\frac{1}{2}x + 2$ ________
b. $y=2x - 2$

Answer: a

ITEM 3

Determine which sentence fits the table and write the letter on the line to the right.

x	-2	-1	0
y	-3	-2	-1

a. $y=x + 5$
b. $y=x - 1$ ________

Answer: b

ITEM 4

Objective 175

IOX Acceptability Rating: 1

Math

Grades 7-9

MAJOR CATEGORY: Relations, Functions and Graphs

SUB-CATEGORY: Solution Sets of Open Sentences in Two Variables

OBJECTIVE: Given an open number sentence in two variables, the student will solve for the solution set of the sentence.

SAMPLE ITEMS:

Find the solution set of the following open number sentence using set-builder notation.

$$3x + y = 6$$

Answer: $\{(x,y) : y=6 - 3x\}$, $x \varepsilon R$

ITEM 1

Find the solution set of the following open number sentence using set-builder notation.

$$-5x + y = 2$$

Answer: $\{(x,y) : y= 2 + 5x\}$, $x \varepsilon R$

ITEM 2

Find the solution set of the following open number sentence using set-builder notation.

$$2x - 3y = 6$$

Answer: $\{(x,y) : y = \frac{6 - 2x}{-3}\}$, $x \varepsilon R$

ITEM 3

Find the solution set of the following open number sentence using set-builder notation.

$$3x + 2y = 5$$

Answer: $\{(x,y) : y = \frac{5 - 3x}{2}\}$, $x \varepsilon R$

ITEM 4

Objective 176 | Math

IOX Acceptability Rating: 1 | Grade 7-9

MAJOR CATEGORY: Relations, Functions and Graphs

SUB-CATEGORY: Solution Sets of Inequalities in Two Variables

OBJECTIVE: Given a replacement set R for (x,y) and an inequality in two variables, the student will select the set of ordered pairs in R that satisfy the given sentence.

SAMPLE ITEMS:

Given R = {A=(0,0), B=(0,4), C=(1,-10)} write the letter(s) of the ordered pair(s) in R that satisfies the following sentence.

$$Y<X$$

Answer: C

ITEM 1

Given R ={A=(0,0), B=(0,4), C=(1,-10)} write the letter(s) of the ordered pair(s) in R that satisfies the following sentence.

$$X - 2Y> -1$$

Answer: A, C

ITEM 2

Given R = {A=(0,0), B=(0,4), C=(1,-10)} write the letter(s) of the ordered pair(s) in R that satisfies the following sentence.

$$Y - 2X > 2$$

Answer: B

ITEM 3

Given R = {A=(0,0), B=(0,4), C=(1,-10)} write the letter(s) of the ordered pair(s) in R that satisfies the following sentence.

$$X < 2 - Y$$

Answer: A, C

ITEM 4

Objective 177 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Relations, Functions and Graphs

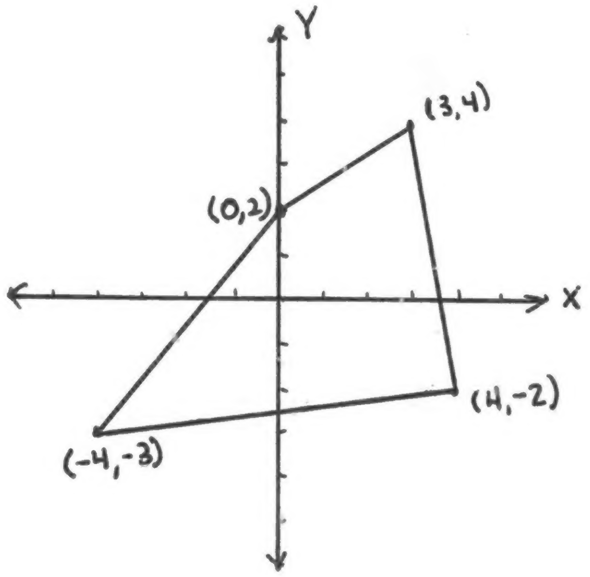
SUB-CATEGORY: Graphing Ordered Pairs on a Rectangular Coordinate System

OBJECTIVE: Given a rectangular coordinate system and a set of ordered pairs of real numbers, the student will graph the ordered pair and connect the points to form a polygon.

SAMPLE ITEM:

Using a rectangular coordinate system, sketch the quadrilateral whose vertices are at (3,4), (0,2), (-4,-3), and (4,-2). Label each point with coordinates.

Answer:



ITEM 1

Objective 178 Math

IOX Acceptability Rating: 1 Grade 7-9

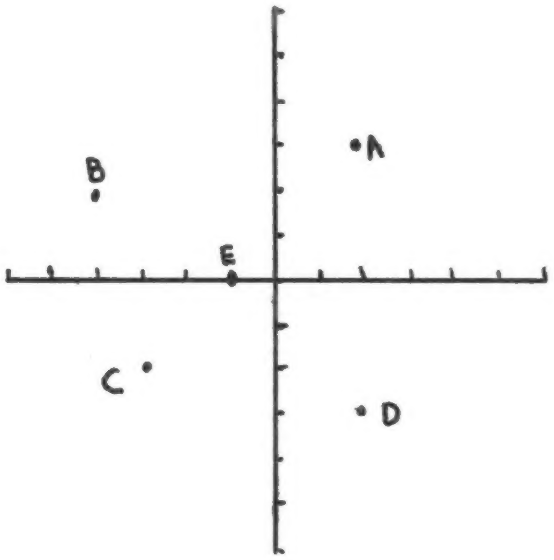
MAJOR CATEGORY: Relations, Functions and Graphs

SUB-CATEGORY: Naming Coordinates of Points on a Rectangular Coordinate System

OBJECTIVE: Given a rectangular coordinate system with points on it, the student will write the coordinates of each point.

SAMPLE ITEM:

Name the coordinates of each point on the graph below.



Answer: A = (2,3)
B = (-4,2)
C = (-3,-2)
D = (2,-3)
E = (-1,0)

ITEM 1

Objective 179 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Relations, Functions and Graphs

SUB-CATEGORY: Specifying the Domain and the Range of a Relation

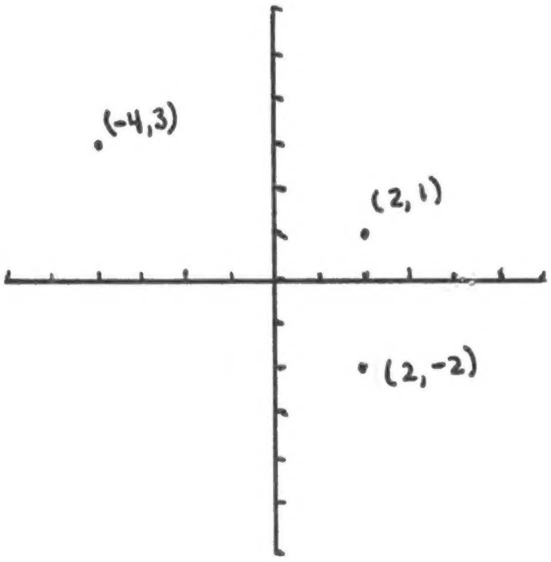
OBJECTIVE: Given a relation, the student will specify the domain, the range, and sketch its graph, labeling each point with its coordinates.

SAMPLE ITEM:

Specify the domain and the range of the following relation:

$$R = \{(2,1),\ (2,-2),\ (-4,3)\}$$

Sketch its graph and label each point with its coordinates.



Answer: Domain = {2,-4}
Range = {1,-2,3}

ITEM 1

Objective 180 Math

IOX Acceptability Rating: 1 Grade 7-9

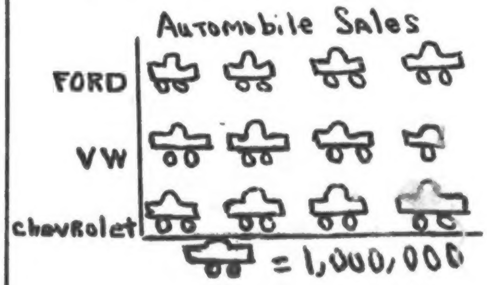
MAJOR CATEGORY: Relations, Functions and Graphs

SUB-CATEGORY: Graphs (Picto, Bar, Circle, Line)

OBJECTIVE: Given graphs and their respective names, the student will match the graph to its correct name.

SAMPLE ITEMS:

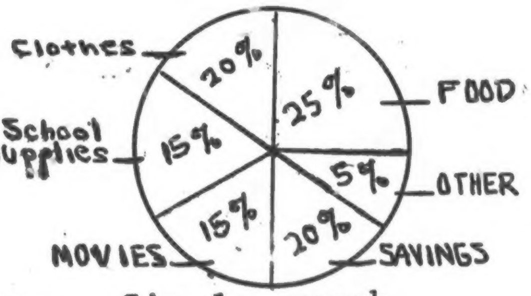
Tell whether the following graph is a bar graph, a line graph, a circle graph, or a pictograph.



Answer: Pictograph

ITEM 1

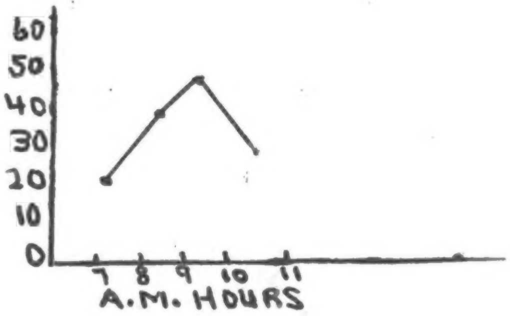
Tell whether the following graph is a bar graph, a line graph, a circle graph, or a pictograph.



Answer: Circle graph

ITEM 2

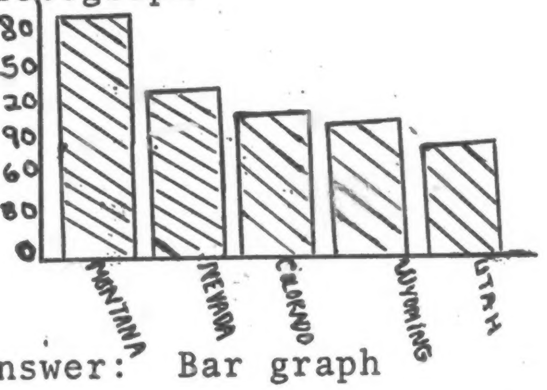
Tell whether the following graph is a bar graph, a line graph, a circle graph, or a pictograph.



Answer: Line graph

ITEM 3

Tell whether the following graph is a bar graph, a line graph, a circle graph, or a pictograph.



Answer: Bar graph

ITEM 4

Objective 181

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Relations, Functions and Graphs

SUB-CATEGORY: Graphs (Picto, Bar, Circle, Line)

OBJECTIVE: Given a table of information, the student will construct a pictograph, bar graph, circle graph and/or line graph.

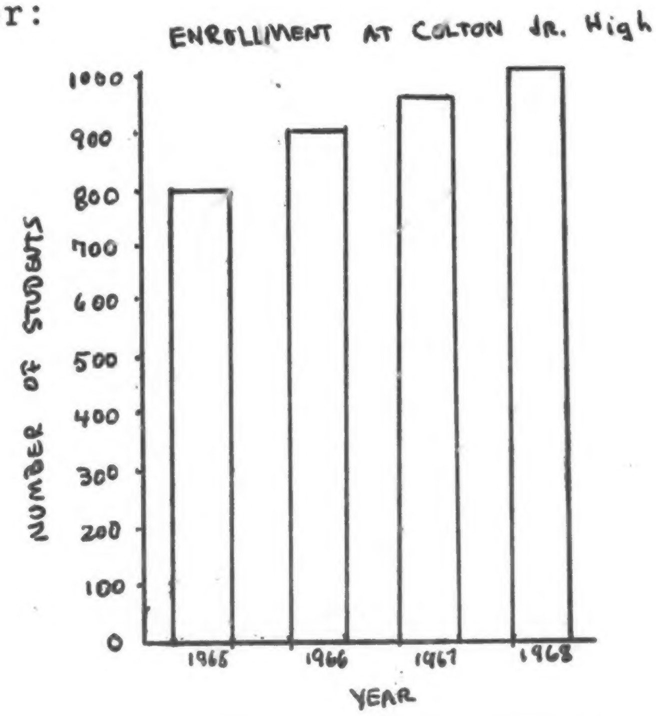
SAMPLE ITEM:

Construct a bar graph to illustrate the following information:

Enrollment at Colton Jr. High

Year	Number of Students
1965	800
1966	900
1967	950
1968	1000

Answer:



ITEM 1

Objective 182 Math

IOX Acceptability Rating: 1 Grade 7-9

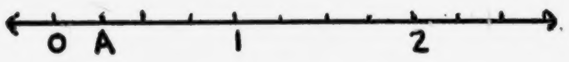
MAJOR CATEGORY: Relations, Functions and Graphs

SUB-CATEGORY: Coordinate Systems on a Line

OBJECTIVE: Given a coordinate system on a line and point A indicated on that system, the student will state the coordinate of point A.

SAMPLE ITEMS:

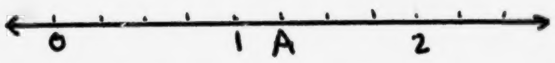
State the coordinate of point A in the coordinate system shown below.



Answer: $\frac{1}{4}$

ITEM 1

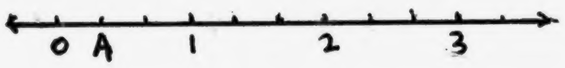
State the coordinate of point A in the coordinate system shown below.



Answer: $\frac{5}{4}$ or $1\frac{1}{4}$

ITEM 2

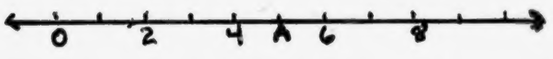
State the coordinate of point A in the coordinate system shown below.



Answer: $\frac{1}{3}$

ITEM 3

State the coordinate of point A in the coordinate system shown below.



Answer: 5

ITEM 4

Objective 183 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Relations, Functions and Graphs

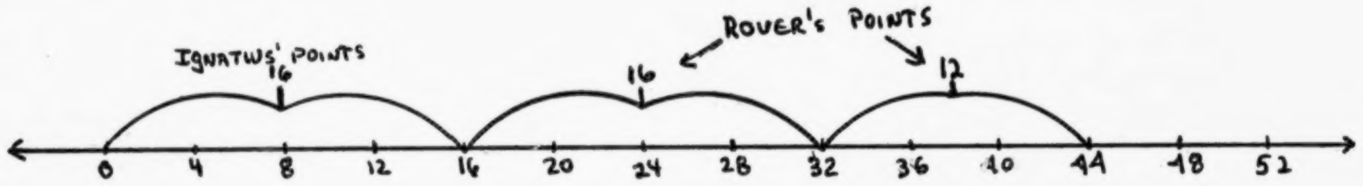
SUB-CATEGORY: Coordinate Systems on a Line:
Use in Problem Solving

OBJECTIVE: Given a verbally stated problem, the student will draw a diagram showing a coordinate system which illustrates the process used to solve the problem.

SAMPLE ITEM:

In a volleyball game, Rover scored 12 points more than his teammate, Ignatius. Together, they scored a total of 44 points. How many points did each boy score? Draw a diagram showing a coordinate system in which the segments from the origin to the graph of 44 represents the 44-point total scored by the boys.

Answer: Ignatius---16 points
Rover------16 + 12 = 28 points



ITEM 1

Objective 184

IOX Acceptability Rating: 1

Math

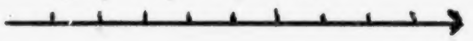
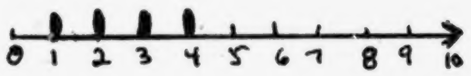
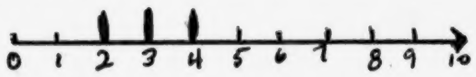
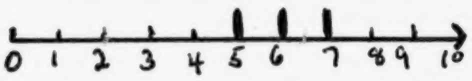
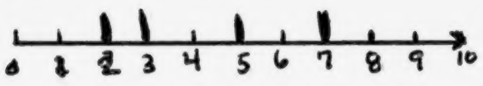
Grade 7-9

MAJOR CATEGORY: Relations, Functions and Graphs

SUB-CATEGORY: Coordinate Systems of a Line

OBJECTIVE: Given a number line and a set of numbers, the student will graph the given set.

SAMPLE ITEMS:

Graph the given set. {1, 2, 3, 4}  Answer:  0 1 2 3 4 5 6 7 8 9 10	Graph the given set. {Whole numbers between 1 and 5} Answer:  0 1 2 3 4 5 6 7 8 9 10
Graph the given set. {5, 6, 7} Answer:  0 1 2 3 4 5 6 7 8 9 10	Graph the given set. {Prime numbers less than 9} Answer:  0 1 2 3 4 5 6 7 8 9 10

Objective 185 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Relations, Functions and Graphs

SUB-CATEGORY: Graphing Solution Sets when the Domain is R

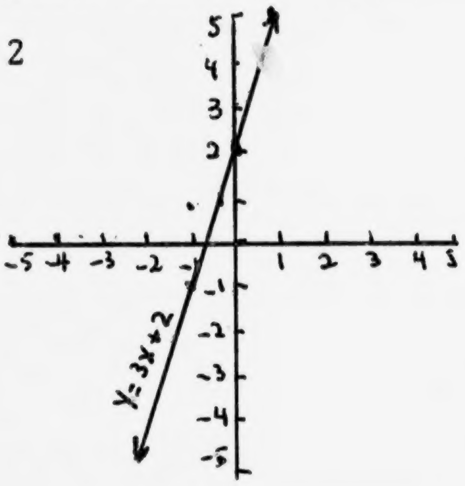
OBJECTIVE: Given an equation with a domain R, the student will graph the solution set.

SAMPLE ITEMS:

Graph the solution set of the equation when the domain is R.

$Y = 3x + 2$

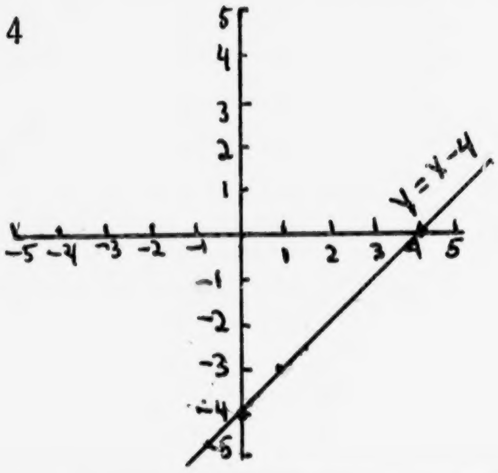
Answer:



Graph the solution set of the equation when the domain is R.

$Y = x - 4$

Answer:



Objective 186 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Relations, Functions and Graphs

SUB-CATEGORY: Graphing Functions, Domain is R (real numbers)

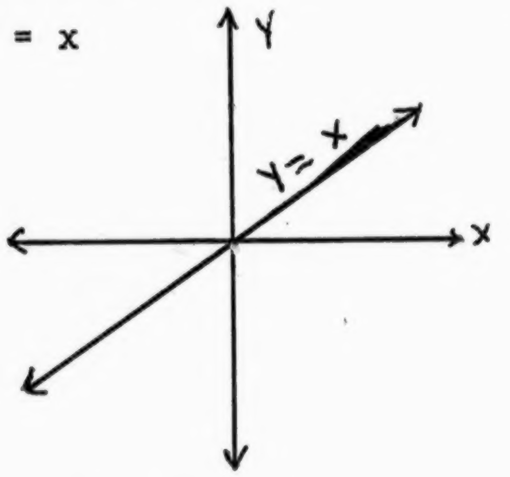
OBJECTIVE: Given a function and R, the domain, the student will graph each function.

SAMPLE ITEMS:

Given that the domain is R, graph the function:

$(x,y) : y = x$

Answer:

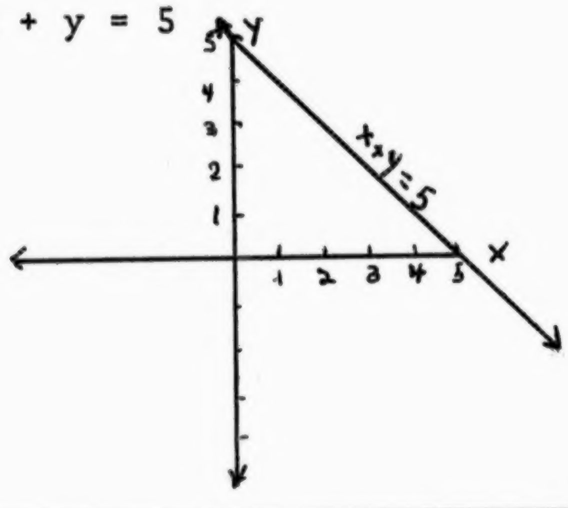


ITEM 1

Given that the domain is R, graph the function:

$(x,y) : x + y = 5$

Answer:



ITEM 2

Objective 187

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Relations, Functions and Graphs

SUB-CATEGORY: Graphing Linear Equations

OBJECTIVE: Given a set of equations, the student will identify those that define a linear function.

SAMPLE ITEMS:

Tell whether this equation defines a linear function. $X^2 + Y = 0$ Answer: no ITEM 1	Tell whether this equation defines a linear function. $4X = 8$ Answer: yes ITEM 2
Tell whether this equation defines a linear function. $X^2 = Y^2 + 4$ Answer: no ITEM 3	Tell whether this equation defines a linear function. $Y = X - 6$ Answer: yes ITEM 4

Objective 188 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Relations, Functions and Graphs

SUB-CATEGORY: Graphing Inequalities

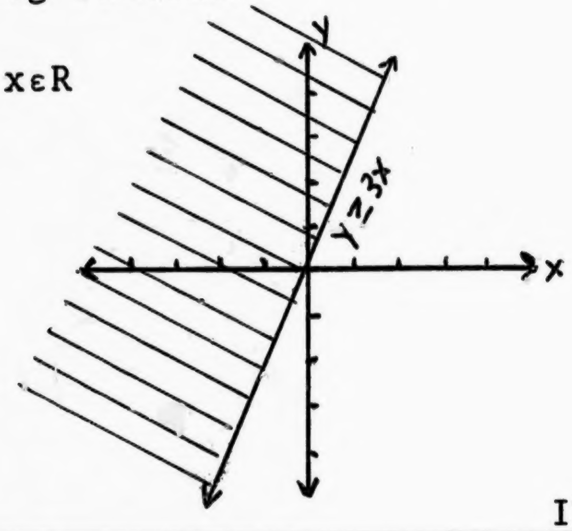
OBJECTIVE: Given an inequality and domain of R (real numbers), the student will graph the inequality.

SAMPLE ITEMS:

Graph the following relation.

$\{(x,y) : y > 3x\}\ x \varepsilon R$

ANSWER:

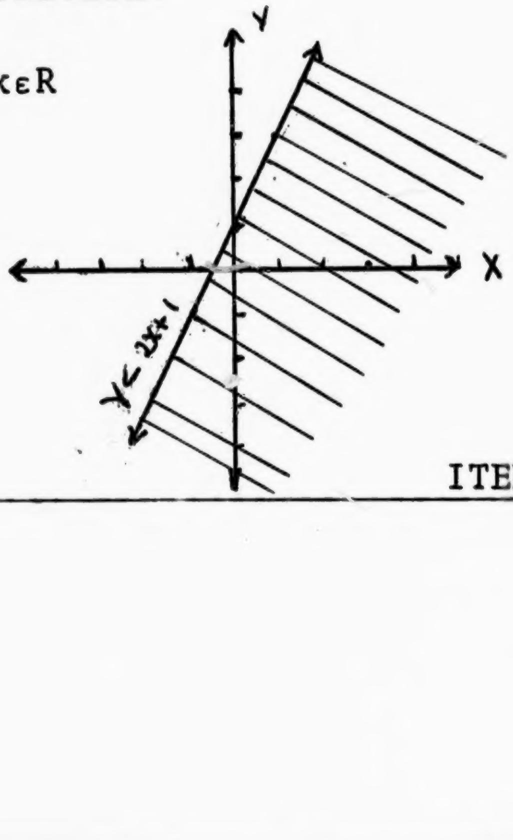


ITEM 1

Graph the following relation.

$\{(x,y) : y < 2x + 1\}\ x \varepsilon R$

ANSWER:



ITEM 2

Objective 189 — Math

IOX Acceptability Rating: 1 — Grade 7-9

MAJOR CATEGORY: Relations, Functions and Graphs

SUB-CATEGORY: Solving Systems of Equations by Graphing

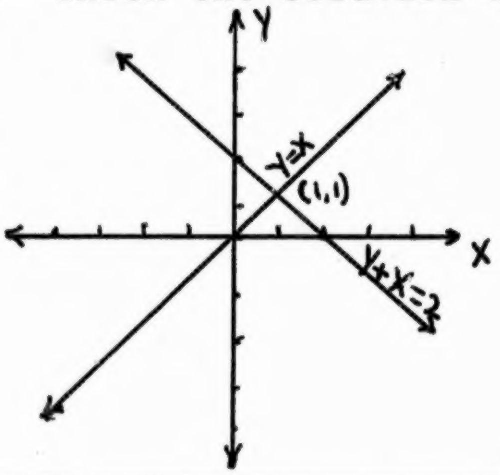
OBJECTIVE: Given a system of equations, the student will: 1) solve the system by graphing both equations using the same set of coordinate axes; 2) check the solution set by substituting in both given equations.

SAMPLE ITEMS:

Solve the given system of equations by graphing both equations on the same set of coordinate axes. Check the solution set in both equations.

$$Y = X$$
$$Y + X = 2$$

Answer:

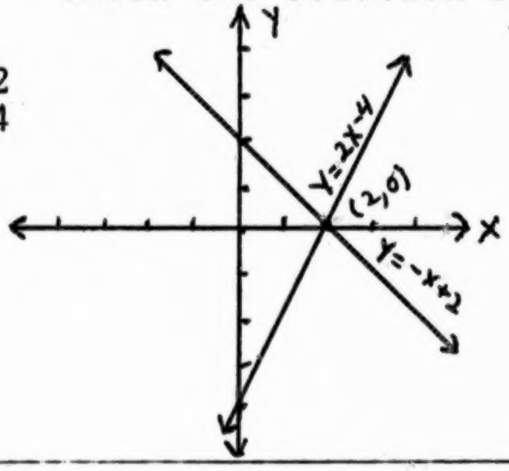


ITEM 1

Solve the given system of equations by graphing both equations on the same set of coordinate axes. Check the solution set in both equations.

$$Y = -X + 2$$
$$Y = 2X - 4$$

Answer:



ITEM 2

Objective 190 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Relations, Functions and Graphs

SUB-CATEGORY: Recognition of Functions

OBJECTIVE: Given a set of relations, the student will identify those which are functions.

SAMPLE ITEMS:

Tell whether the following relation is a function.

$\{(-5,10), (1,-10), (-5,5), (1,-1)\}$

Answer: no

ITEM 1

Tell whether the following relation is a function.

$\{(4,5), (3,4), (5,6), (6,7)\}$

Answer: yes

ITEM 2

Tell whether the following relation is a function.

$\{(4,-5), (7,6), (4,5), (7,-6)\}$

Answer: no

ITEM 3

Tell whether the following relation is a function.

$\{(5,3), (9,7), (2,0), (8,6)\}$

Answer: yes

ITEM 4

Objective 191 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Relations, Functions and Graphs

SUB-CATEGORY: Graphing Quadratic Equations

OBJECTIVE: Given a quadratic equation in the form $Y = AX^2 + BX + C$ (A, B, and C being integers and $A \neq 0$), the student will construct the graph of the equation, naming the X and Y-intercepts and the vertex of the parabola.

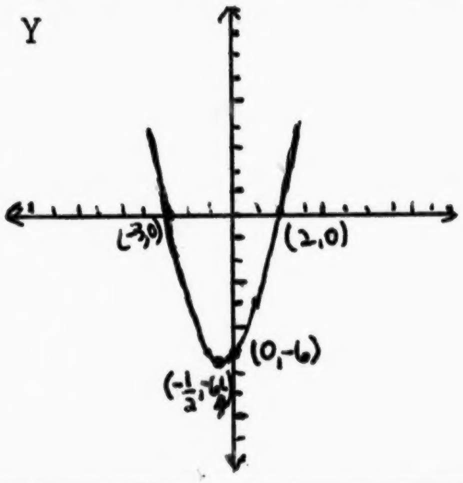
SAMPLE ITEMS:

Given the following quadratic equation graph the equation giving the X and Y-intercepts and the vertex of the parabola.

$$X^2 + X - 6 = Y$$

Answer:

Y-intercept= -6
X-intercept= {2,-3}
Vertex= $(-\frac{1}{2}, -6\frac{1}{4})$



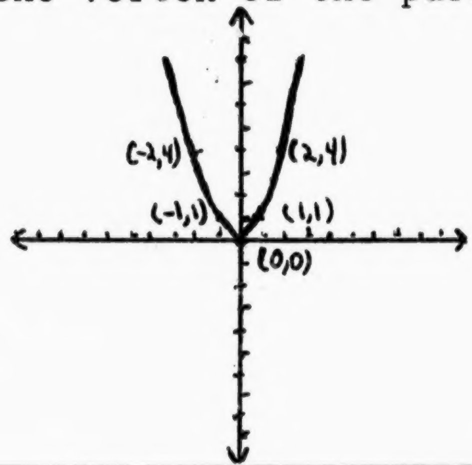
ITEM 1

Given the following quadratic equation graph the equation giving the X and Y-intercepts and the vertex of the parabola.

$$Y = X^2$$

Answer:

Y-intercept= 0
X-intercept= {any integers}
Vertex= (0,0)



ITEM 2

Objective 192 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Relations, Functions and Graphs

SUB-CATEGORY: Graphing: Slope and Y-intercept of a Line

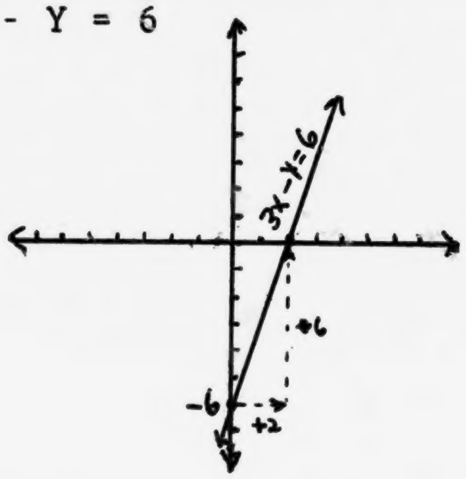
OBJECTIVE: Given an equation in two unknowns of the first degree, the student will graph the equation and give the slope and Y-intercept.

SAMPLE ITEMS:

Draw the graph of the following equation; from the graph find the slope of the line and the Y-intercept.

$3X - Y = 6$

Answer: Y-Intercept= -6
Slope= $\frac{6}{2}=3$

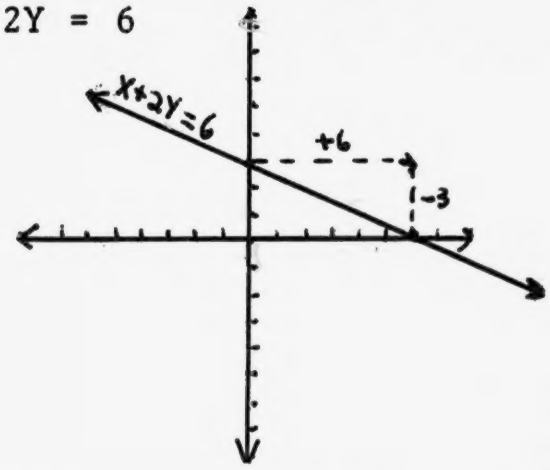


ITEM 1

Draw the graph of the following equation; from the graph find the slope of the line and the Y-intercept.

$X + 2Y = 6$

Answer: Y-intercept= 3
Slope=$-\frac{3}{6}=-\frac{1}{2}$



ITEM 2

Objective 193 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Relations, Functions and Graphs

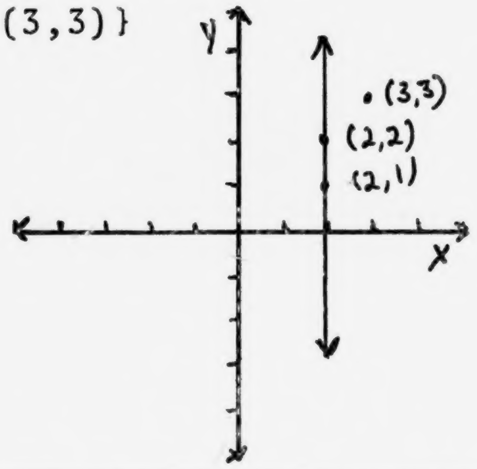
SUB-CATEGORY: Testing whether a Relation is a Function

OBJECTIVE:	Given a set of relations, using the vertical line test, the student will identify those relations which are functions.

SAMPLE ITEMS:

Graph the following relation and, using the vertical line test, tell whether the relation is a function.

Q = {(2,1), (2,2), (3,3)}



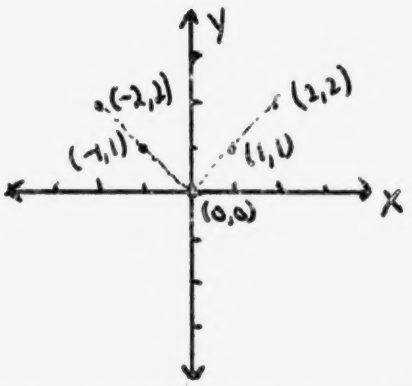
Answer:

No it is not a function.

ITEM 1

Graph the following relation and, using the vertical line test, tell whether the relation is a function.

R = {(-2,2), (-1,1), (0,0), (1,1), (2,2)}



Yes it is a function.

ITEM 2

Objective 194

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Relations, Functions and Graphs

SUB-CATEGORY: Using slope and Y-intercept

OBJECTIVE: Given the necessary information to find the slope and the Y-intercept, the student will draw the graph of the line and give the equation of the line.

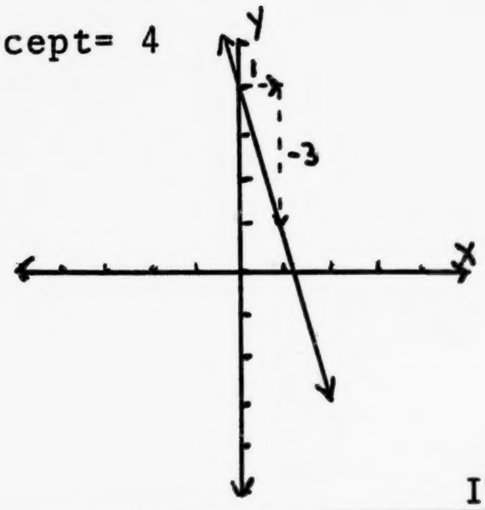
SAMPLE ITEMS:

Draw the graph and give the equation using the following information.

Slope= -3, Y-intercept= 4

Answer: Equation:

Y = -3X + 4



ITEM 1

Draw the graph and give the equation using the following information. Also give the slope and the Y-intercept.

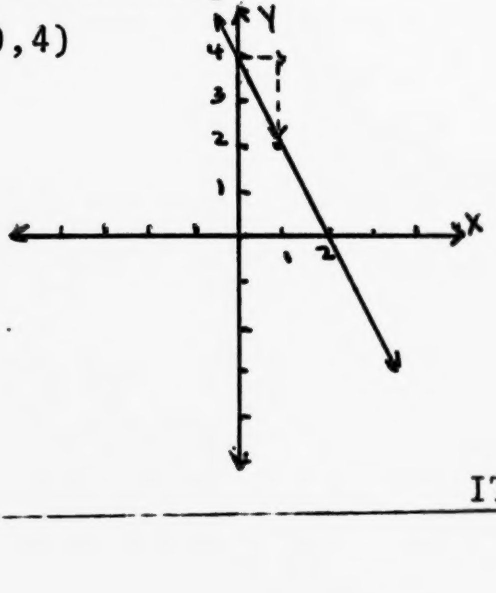
Points (1,2) and (0,4)

Answer: Equation:

Y = -2x + 4

Slope: -2

Y-intercept: 4



ITEM 2

Objective 195 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Probability and Statistics

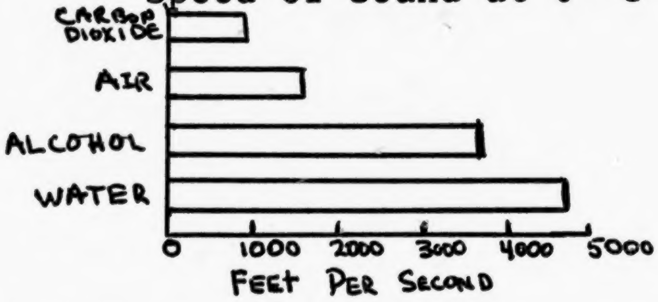
SUB-CATEGORY: Interpreting Data on a Graph

OBJECTIVE: Given a graph and a set of questions, the student will answer the questions by interpreting the statistical data presented on on the graph.

SAMPLE ITEM:

Answer the following questions about the given graph.

Speed of Sound at 0° C



1. What is the data unit with which the horizontal axis is scaled?

2. In which of the four substances does sound travel fastest?

3. What is the approximate speed of sound in alcohol?

4. How many times faster does sound appear to travel in water than in air?

Answer: 1. (1000) feet per second
2. Water
3. 3500 feet per second
4. 3 times

ITEM 1

Objective 196 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Probability and Statistics

SUB-CATEGORY: Empirical Probability

OBJECTIVE: Given an experiment with random sampling, the student will answer simple questions about future occurrences regarding the given sample.

SAMPLE ITEM:

Here is an experiment involving drawing marbles from a jar. The results of the first 35 drawings are shown on the chart. What is the empirical probability that the next draw will be :

1. Yellow?
2. Blue?
3. Red?
4. Not a blue marble?

YELLOW	𝍸 III
BLUE	𝍸 𝍸 III
RED	𝍸 𝍸 IIII

Answer: 1. $\frac{8}{35}$

2. $\frac{13}{35}$

3. $\frac{14}{35}$

4. $\frac{22}{35}$

ITEM 1

Objective 197 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Probability and Statistics

SUB-CATEGORY: Probability of Combined Events

OBJECTIVE: Given an incomplete table summarizing information about the probability of occurrences of certain events in a given sample space, the student will supply the missing information.

SAMPLE ITEM:

Fill in the empty boxes with the correct answer.

	NUMBER OF ELEMENTS IN							
	SAMPLE SPACE	E	F	$E \cap F$	$P(E)$	$P(F)$	$P(E \cap F)$	$P(E \cup F)$
	15	5	7	2	$\frac{5}{15}$	$\frac{7}{15}$	$\frac{2}{15}$	$\frac{2}{3}$
1.	15	6	3	1			$\frac{1}{15}$	
2.	15	11	7	3	$\frac{11}{15}$	$\frac{7}{15}$		1
3.	25	18	10	5			$\frac{5}{25}$	$\frac{23}{25}$
4.	25	15	7	5			$\frac{5}{25}$	

Answer: 1. $\frac{6}{15}$ or $\frac{2}{5}$, $\frac{3}{15}$ or $\frac{1}{5}$, $\frac{8}{15}$

2. $\frac{3}{15}$ or $\frac{1}{5}$

3. $\frac{18}{25}$, $\frac{10}{25}$ or $\frac{2}{5}$

4. $\frac{15}{25}$ or $\frac{3}{5}$, $\frac{7}{25}$, $\frac{17}{25}$

ITEM 1

Objective 198

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Probability and Statistics

SUB-CATEGORY: Probability of Combined Events (Event, Favorable Outcomes)

OBJECTIVE: Given two mutually exclusive events, the student will answer related problem questions.

SAMPLE ITEM:

The whole numbers from 1 - 20 are written on 20 papers. A paper is drawn at random from the pack. What is the probability that the number on the paper is:

A) Greater than 10

B) Greater than 9 or less than 4

C) Either less than 8 or divisible by 11

D) Either a member of the set {5,7,11} or greater than 15.

Answer:

A) $\frac{1}{2}$

B) $\frac{14}{20}$ or $\frac{7}{10}$

C) $\frac{8}{10}$ or $\frac{4}{5}$

D) $\frac{8}{20}$ or $\frac{2}{5}$

ITEM 1

Objective 199

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Probability and Statistics

SUB-CATEGORY: Probability of an Event

OBJECTIVE: Given an exercise involving probability of an event, the student will list the favorable outcomes and find the probability that F will occur, given that E represents the event that the numeral names.

SAMPLE ITEM:

Twenty slips of paper are labeled with numerals for numbers 1 - 20, each slip having a different number. The slips are mixed up so you draw one at random.

List the favorable outcomes and find the probability that E will occur for the following examples.

A) An even number

B) An odd number

C) A number less than 10

D) A number greater than 9

Answer:

A) 2,4,6,8,10,12,14,16,18,20 $\frac{1}{2}$

B) 1,3,5,7,9,11,13,15,17,19 $\frac{1}{2}$

C) 1,2,3,4,5,6,7,8,9, $\frac{9}{20}$

D) 10,11,12,13,14,15,16,17,18,19,20 $\frac{11}{20}$

ITEM 1

Math

Grade 7-9

Objective 200

IOX Acceptability Rating: 1

MAJOR CATEGORY: Probability and Statistics

SUB-CATEGORY: Probability of an Outcome

OBJECTIVE: Given an exercise involving probability, the student will state the number of possible outcomes in the sample space and find the probability of an indicated outcome.

SAMPLE ITEMS:

State the number of possible outcomes in the sample space and find the probability of the indicated event for the following.

One die is tossed.

P (6 on the die) =

Answer: 6, $P(E) = \frac{1}{6}$

State the number of possible outcomes in the sample space and find the probability of the indicated event for the following.

One card is drawn from a pack of 52 cards.

P(drawing an Ace of Spades)=

Answer: 52, $P(E) = \frac{1}{52}$

State the number of possible outcomes in the sample space and find the probability of the indicated event for the following.

One team is selected from a set of 30 teams.

P(Team A being selected) =

Answer: 30, $P(E) = \frac{1}{30}$

State the number of possible outcomes in the sample space and find the probability of the indicated event for the following.

A coin is flipped.

P(heads up) =

Answer: 2, $P(E) = \frac{1}{2}$

Objective 201 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Probability and Statistics

SUB-CATEGORY: Frequency Distributions

OBJECTIVE: Given a frequency table representing a frequency distribution, the student will present the given information as a histogram and as a frequency polygon.

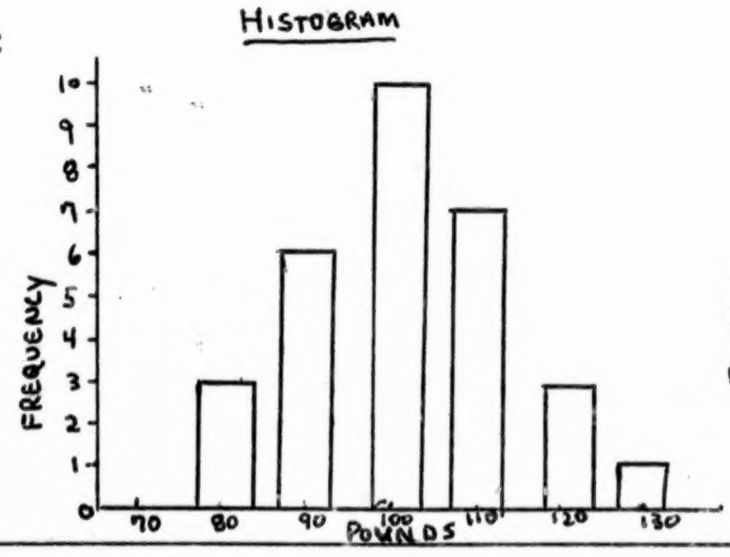
SAMPLE ITEM:

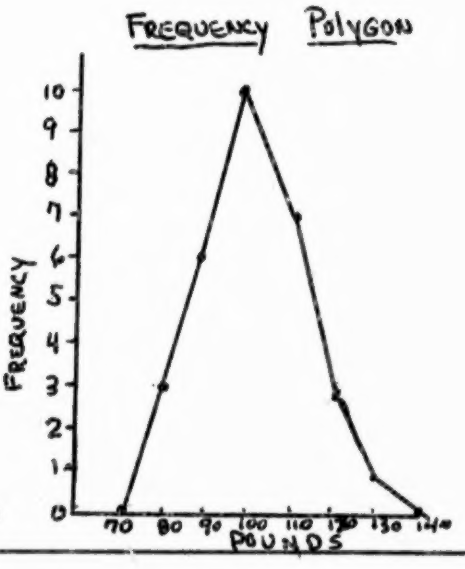
Display the given information as a histogram and as a frequency polygon.

Weight of Selected Boys

Weight	Frequency
80	3
90	6
100	10
110	7
120	3
130	1

Answer:





Objective 202

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Probability and Statistics

SUB-CATEGORY: Mean, Median, Mode

OBJECTIVE: Given a set of items in a list of data, the student will make a frequency table for the given data, draw the indicated graph of the distribution and determine the mean, median and mode.

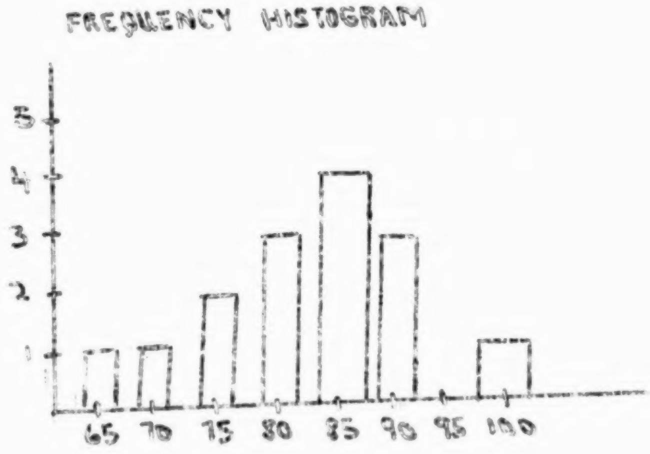
SAMPLE ITEM:

Ellen's test scores for the year were 85, 75, 80, 90, 80, 90, 85, 65, 85, 80, 75, 70, 100, 90, 85. Make a frequency table and draw a histogram of the distribution. Determine the mean, median and mode.

Answer:

FREQUENCY TABLE

SCORE	FREQUENCY
65	1
70	1
75	2
80	3
85	4
90	3
95	0
100	1



MODE - 85
MEDIAN - 85
MEAN - 82 $\frac{1}{3}$

ITEM 1

Objective 203

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Probability and Statistics

SUB-CATEGORY: Vocabulary of Probability

OBJECTIVE: Given a definition in the set of the terminology of probability and three or more sample answers, the student will select the correct answer.

SAMPLE ITEMS:

Select the correct answer for the following. An experiment in which the outcome is a matter of chance is A)sample space B) experiment outcome C)Random experiment. Answer: C ITEM 1	Select the correct answer for the following. The set of all possible outcomes is A)sample space B)sample point C)sample event. Answer: A ITEM 2
Select the correct answer for the following. A set of favorable outcomes is A) a disjoint set B) an event C) an outcome. Answer: B ITEM 3	Select the correct answer for the following. Taking a bath at home and going to Disneyland are A)Exclusive sets B)intersections C)mutually exclusive events. Answer: C ITEM 4

Objective 204 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Probability and Statistics

SUB-CATEGORY: Possible Outcomes of an Experiment

OBJECTIVE: Given two different coins which are to be tossed together, the student will list all possible outcomes of the experiment and design at least 4 questions and answers about his experiment.

SAMPLE ITEM:

Toss two different coins at the same time. List the set of all possible outcomes. Design four questions and answers about your experiment.

Answer:

Dime	Penny
H	H
H	T
T	H
T	T

Sample Space:

$\{HH, HT, TH, TT\}$

Four Questions

S = the set which is the sample space. Tell whether the following are true or false:

A) $HH \in S$	True
B) $\{TH\} \subset S$	True
C) $\{T\} \subset S$	False
D) $H \in S$	False

ITEM 1

Objective 205

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Probability and Statistics

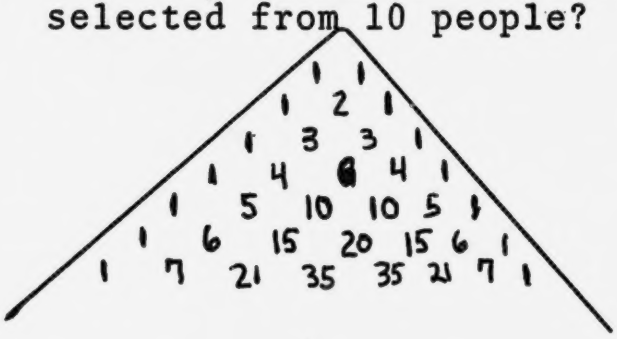
SUB-CATEGORY: Pascal's Triangle

OBJECTIVE: Given Pascal's Triangle and a set of questions the student will extend the triangle four more rows and answer the set of questions.

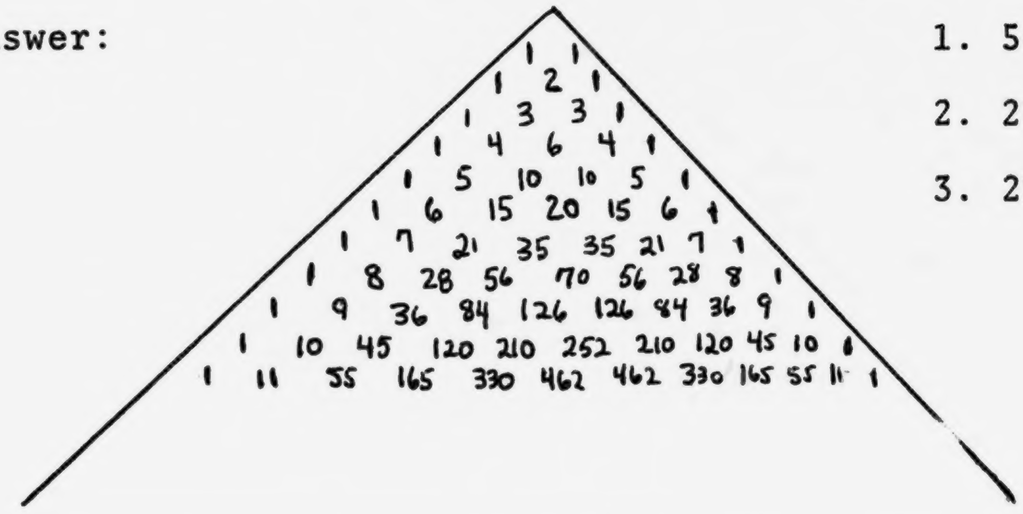
SAMPLE ITEM:

Extend the triangle 4 more rows and use it to answer these questions:

1. How many committees of 3 members can be selected from 8 people?
2. How many teams of 5 members can be selected from 7 people?
3. How many teams of 4 members can be selected from 10 people?


1 1
1 2 1
1 3 3 1
1 4 6 4 1
1 5 10 10 5 1
1 6 15 20 15 6 1
1 7 21 35 35 21 7 1

Answer:


1 1
1 2 1
1 3 3 1
1 4 6 4 1
1 5 10 10 5 1
1 6 15 20 15 6 1
1 7 21 35 35 21 7 1
1 8 28 56 70 56 28 8 1
1 9 36 84 126 126 84 36 9 1
1 10 45 120 210 252 210 120 45 10 1
1 11 55 165 330 462 462 330 165 55 11 1

1. 56
2. 21
3. 210

ITEM 1

Objective 206 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Probability and Statistics

SUB-CATEGORY: Sample Space

OBJECTIVE: Given an incomplete sample space chart, the student will complete the chart and use it to answer related probability problems.

SAMPLE ITEM:

Complete the sample space chart for a 2-die experiment and use the chart to answer the following questions.

(1,1)	(1,)	(1,3)	(1,4)	(1,)	( )
(2,1)	(,2)	(,3)	(2,4)	( )	( )
(3,1)	( )	( )	( )	(3,5)	( )
(4,1)	( )	(4,3)	( )	( )	(4,6)
( )	(5,2)	( )	( )	(5,5)	( )
( )	( )	(6,3)	( )	( )	(6,6)

1. Find the probability of getting a 7 with 2 dice.
2. Find the probability of getting a 10 with 2 dice.
3. Find the probability of getting a 2 with 2 dice.

Answer: 1. P(7) = $\frac{1}{6}$

2. P(10) = $\frac{3}{36} = \frac{1}{12}$

3. P(10) = $\frac{1}{36}$

	(1,2)			(1,5)	(1,6)
	(2,2)	(2,3)		(2,5)	(2,6)
	(3,2)	(3,3)	(3,4)		(3,6)
	(4,2)		(4,4)	(4,5)	
(5,1)		(5,3)	(5,4)		(5,6)
(6,1)	(6,2)		(6,4)	(6,5)	

ITEM 1

Objective 207 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Probability and Statistics

SUB-CATEGORY: Probability of an Event

OBJECTIVE: Given a problem involving probability, the student will state the probability of an indicated event.

SAMPLE ITEMS:

Solve the following:

Given a jar of marbles with 10 blue, 4 red and 7 green marbles, find the probability of drawing a green marble on your first draw.

Answer: $P(G) = \frac{7}{21} = \frac{1}{3}$

ITEM 1

Solve the following:

Given a deck of 52 cards, find the probability of drawing an ace on your first draw.

Answer: $P(A) = \frac{4}{52} = \frac{1}{13}$

ITEM 2

Solve the following:

Given a single die, with six numbers on it, find the probability of throwing a 1 on your first throw.

Answer: $P(1) = \frac{1}{6}$

ITEM 3

Solve the following:

Given a penny, find the probability of flipping a "heads" on your first flip.

Answer: $P(H) = \frac{1}{2}$

ITEM 4

Objective 208 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Applications, Problem Solving

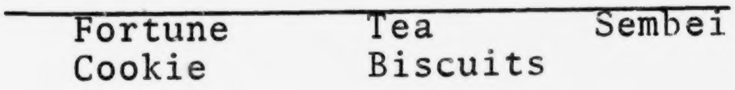
SUB-CATEGORY: Speed Time, Distance

OBJECTIVE: Given a verbally stated problem involving speed-to-time distance, the student will write a numerical expression and a solution to the problem.

SAMPLE ITEMS:

Write a numerical expression and a solution to the following problem:

Fortune Cookie, Tea Biscuits, and Sembei are located on a long straight highway, as shown. If it is 118 miles from Sembei to Tea Biscuits and 198 miles from Tea Biscuits to Fortune Cookie, how far is it from Sembei to Fortune Cookie?



Answer: 198 + 118 = 316

ITEM 1

Write a numerical expression and a solution to the following problem:

The flying time nonstop jet from New York to Los Angeles is 5 2/3 hours. The return flight takes 4 3/4 hours. How much longer is the initial flight?

Answer: 5 2/3 - 4 3/4 = $\frac{11}{12}$ hours

ITEM 2

Objective 209

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Applications, Problem Solving

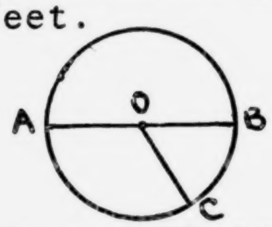
SUB-CATEGORY: Measurement

OBJECTIVE: Given a verbally stated problem involving measurement, the student will write a numerical expression and a solution to the problem.

SAMPLE ITEMS:

Solve the following:

The distance around the circular plot of land shown in the diagram measures 223 feet.



A. How far would a person walk if he followed a path straight across from A to B?

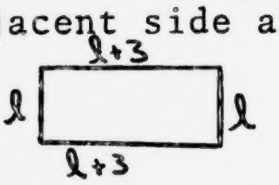
B. How far would he walk if he started from A, walked to Center O, then continued on to Point C?

Answer: A. $70\frac{21}{22}$, B. $70\frac{21}{22}$

ITEM 1

Solve the following:

What are the lengths of the sides of a rectangle if one side is 3" longer than an adjacent side and the perimeter is 34"?



Answer: length - 10", width - 7"

ITEM 2

Objective 210

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Applications, Problem Solving

SUB-CATEGORY: Money

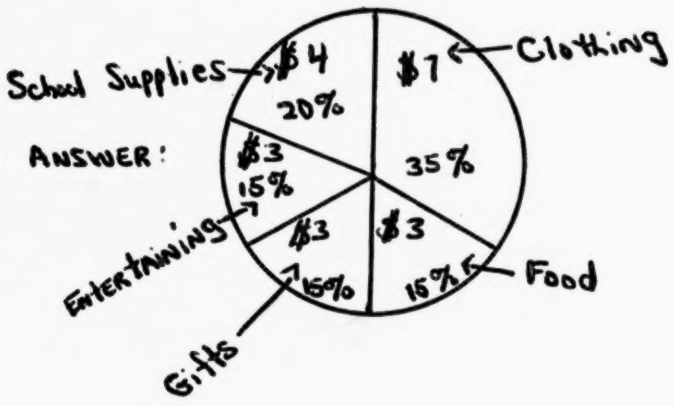
OBJECTIVE: Given a set amount of money, and a series of normal personal expenses, the student will construct a budget in the form of a graph or a table for himself using both percents and actual amounts.

SAMPLE ITEM:

Use a graph or a table to construct a budget with $20. per week and using clothing, food, school supplies, entertainment, and gifts as your categories. Include both percents and actual amounts.

Answers: ANSWERS WILL VARY.

POSSIBLE ANSWER:



Objective 211 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Applications, Problem Solving

SUB-CATEGORY: Writing Word Problems

OBJECTIVE: Given an equation, the student will write a verbally stated problem in two of the following areas: sports, sewing, woodworking, science, banking architecture, and real estate.

SAMPLE ITEM:

Select two of the categories and two of the given equations. Write 2 word problems for which the given equations express the number facts.

Categories: sports, sewing, woodworking, science, banking, architecture, real estate, cooking.

Equations: $\frac{2}{3} + x = 1\frac{3}{4}$ $\frac{1x}{2} + 6 = 18$

$3x - 2 = 7$ $x + 4x = 55$

Answer: (answers will vary); Sample Answer:

$\frac{2}{3} + x = 1\frac{3}{4}$

Sue had $\frac{2}{3}$ of a yard of red and yellow cloth and needed $1\frac{3}{4}$ yards for the pant-dress she wanted to make. How much more material does she need to buy?

ITEM 1

Objective 212

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Applications, Problem Solving

SUB-CATEGORY: Applications of the Metric System

OBJECTIVE: Given a verbally stated problem involving the metric system, the student will solve the problem.

SAMPLE ITEMS:

Solve the following.

If a runner can run the 100 yard dash in 10 seconds, how long do you expect it would take him to run the 100 meter dash.

Answer: About 11 seconds

ITEM 1

Solve the following.

How much is a kilohour?

Answer: 1000 x 1 hr. = 1000 hr.

ITEM 1

Solve the following.

Which is more, 20 kilograms or forty pounds?

Answer: 20 kilograms
(1 kilogram = 2.2 lbs.)

ITEM 3

Solve the following.

If a piece of paper is 10 inches long, how many centimeters long is it?

Answer: About 25 cm.
(1 cm. = 2.54 inches)

ITEM 4

Objective 213 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Applications, Problem Solving

SUB-CATEGORY: Temperature

OBJECTIVE: Given a verbally stated problem involving temperature scales, the student will solve the problem.

SAMPLE ITEMS:

Solve the following:

In one year, in the northern part of the United States, the highest temperature was 110° F. Express this temperature using the centigrade scale. $[C = \frac{5}{9}(F - 32)]$

Answer: $43\frac{1}{3}^\circ$ C

ITEM 1

Solve the following:

The temperature of the surface of the sun has been estimated to be approximately 6000° C. Show that this is approximately $11,000^\circ$F. $(F = \frac{9}{5}C + 32)$

Answer: $\frac{9}{5} \times 6000 + 32 = 10,832 \cong 11,000^\circ F$

ITEM 2

Solve the following:

Temperatures in the interior of the sun have been estimated to be as high as $20,000,000^\circ$ C. Express this temperature on the Fahrenheit scale. $(F = \frac{9}{5}C + 32)$

Answer: $36,000,032^\circ$ F

ITEM 3

Objective 214 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Applications, Problem Solving

SUB-CATEGORY: Problem Solving with Fractions

OBJECTIVE: Given a verbally stated problem involving fractions, the student will solve the problem.

SAMPLE ITEMS:

Solve the following. Use your own judgment as to which form of a fraction will make the solution easier.

A machinist wishes to cut four $3\frac{1}{6}$ inch bolts from a rod. Each time he makes a cut, he allows $\frac{3}{4}$ inch for waste in cutting and finishing. Can he get all four bolts out of a rod that is 16 inches long?

Answer: Yes, $3\frac{1}{6} + \frac{3}{4} = 3\frac{11}{12}$, $(4 \cdot 3\frac{11}{12}) < 16$

ITEM 1

Solve the following. Use your own judgment as to which form of a fraction will make the solution easier.

Betty's car averages 14 miles per gallon of gasoline. She pays $36\frac{9}{10}$ for a gallon. How much will the gasoline cost her for a 182-mile trip?

Answer: $4.80

ITEM 2

Solve the following. Use your own judgment as to which form of a fraction will make the solution easier.

On a hiking trip, Rob and Saul found they were walking about 3.2 miles per hour. They plan to hike 14.8 miles. About how long will they be walking to cover this distance at their rate of speed?

Answer: $4\frac{5}{8}$ hours, or 4.6 hours or 4 hours and $37\frac{1}{2}$ minutes.

ITEM 3

Objective 215

Math

IOX Acceptability Rating: 1

Grade 7-9

MAJOR CATEGORY: Applications, Problem Solving

SUB-CATEGORY: Problems with Circles

OBJECTIVE: Given a verbally stated problem involving the relationship between radius, diameter, circumference of a circle, the student will solve the problem.

SAMPLE ITEMS:

Solve the following:

A satellite orbits in a circular path at a distance of 4400 miles from the center of the Earth. How far does it travel, to the nearest thousand miles, in completing one circuit? ($\pi=3.14$)

Answer: 28,000 (nearest thousand)

ITEM 1

Solve the following:

Baker High School is building a new circular ice-skating rink. They wish to design the rink in such a way that 15 trips around the outside rail will equal one mile. To the nearest foot, what should the radius of the rink be?

Answer: 56'

ITEM 2

Solve the following:

The orbit of the Earth is nearly circular, with a distance from the sun of 93,000,000 (9.3×10^7) miles, to the nearest million. What is the length of the Earth's orbit, to the nearest million miles?

Answer: 584,000,000 miles or 5.84×10^8 miles

ITEM 3

Objective 216

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Applications, Problem Solving

SUB-CATEGORY: Problems with Volume of Cylinder, Cone, Sphere

OBJECTIVE: Given a verbally stated problem involving cylinders, cones, and spheres and the respective formulae, the student will solve for the requested information.

SAMPLE ITEMS:

Solve the following:

A cylindrical wastebasket has a base with a diameter of 9 inches and a height of 14 inches. What is its volume? If you make a wise choice in the value you use for π, you can save yourself a lot of work. ($V = \pi r^2 h$)

Answer: 891 cu. in.

ITEM 1

Solve the following:

A cone-shaped pile of sand is 6 feet high and spread over a circular base with a diameter of 9 feet. How many cubic yards does it contain? ($V = \frac{1}{3}\pi r^2 h$)

Answer: 4.7 cu. yd.

ITEM 2

Solve the following:

An ice-cream scoop has the shape of a hemisphere 2 inches in diameter. What is its volume when filled to the top? (Volume of a sphere: $V = \frac{4}{3}\pi r^3$)

Answer: 2.1 cu. in.

ITEM 3

Objective 217 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Applications, Problem Solving

SUB-CATEGORY: Problem Solving with Integers

OBJECTIVE: Given a verbally stated problem involving operations with integers, the student will solve for the required information.

SAMPLE ITEM:

Solve the following:

Everyone knows that some outboard motors have both a forward speed and a reverse. It is also true that some movie projectors can run a film either forward or backward. Almost everyone, at one time or another, has seen this done with a film. Use this idea to solve the following.

Write a multiplication example and find the product to describe the apparent change in position of the boat in each of the following:

a) The outboard motor is set for 450 feet per minute forward, and the film runs backward for 2 minutes.

b) The outboard motor is set for a reverse speed of 450 feet per minute, and the film runs forward for 2 minutes.

c) The outboard motor is set for a reverse speed of 450 feet per minute, and the film runs backward for 2 minutes.

Answer:

a) 450 x (-2) = -900 feet

b) -450 x (-2) = -900 feet

c) -450 x (-2) = +900 feet

ITEM 1

Objective 218 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Applications, Problem Solving

SUB-CATEGORY: Circles and Designs

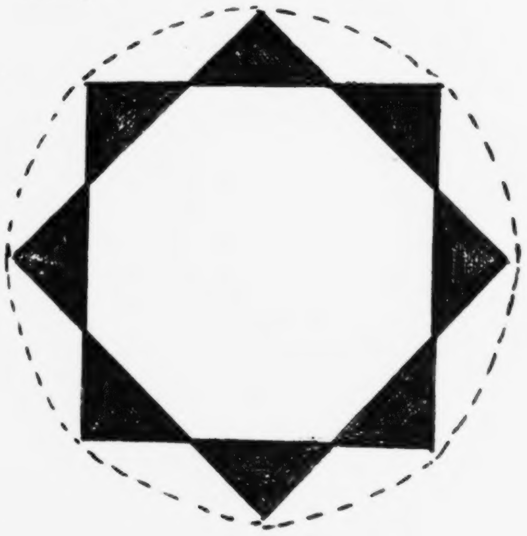
OBJECTIVE: Given a protractor, compass, straightedge and colored pencils, the student will inscribe a square inside a circle and create a balanced design of his own choosing using a combination of two colors.

SAMPLE ITEM:

Draw a circle. Inscribe a square in the circle. Create a 2 color design (using the square as a base) in which you consider balance and symmetry.

Answer: (answers will vary)

Possible Answer:



Objective 219

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Applications, Problem Solving

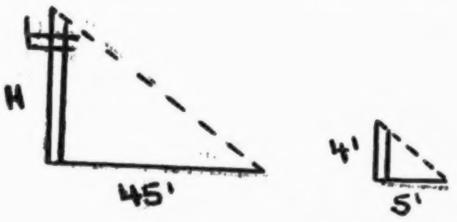
SUB-CATEGORY: Proportions and Indirect Measurement

OBJECTIVE: Given a verbally stated problem involving proportioning by similar triangles, the student will write a proportion with one unknown and solve for the unknown.

SAMPLE ITEMS:

Write a proportion and solve for the unknown measure:

A telephone pole throws a shadow 45 feet long, as shown in the diagram. At the same time, a fence post 4 feet high throws a shadow 5 feet long. What is the height of the telephone pole?

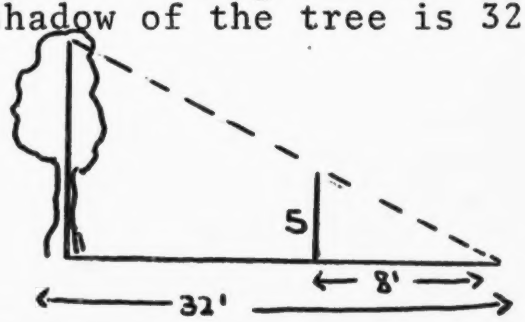


Answer: $\frac{H}{45} = \frac{4}{5}$, H = 36'

ITEM 1

Write a proportion and solve for the unknown measure:

A boy stands so that his shadow just reaches to the tip of the shadow of a tree. His shadow is 8' long and his height is 5', while the length of the shadow of the tree is 32'. What is the height of the tree.



Answer: $\frac{5}{8} = \frac{Y}{32}$, Y = 20 '

ITEM 2

Objective 220 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Applications, Problem Solving

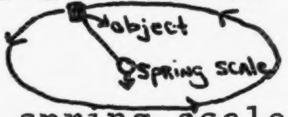
SUB-CATEGORY: Applications in Science

OBJECTIVE: Given a chart of scientific data and statements requiring mathematical interpretation of the given set of data, the student will identify each of the statements as true, false, or not proven.

SAMPLE ITEM:

Centripetal force: You know that when an object moves in a circular path, one of the forces produced is centripetal force. What is the effect of the distance the object is from the center and its speed of rotation on the force produced?

Investigation:



A known weight is attached to a spring scale and whirled at a constant speed, as shown, and the force on the scale is noted. The object is then whirled at twice the speed, and the difference in force on the scale is recorded. Now, the length of the string holding the object is doubled, and the object is whirled at the same two speeds as before. The results are shown in the table below:

DISTANCE OF WEIGHT FROM THE CENTER	SPEED OF ROTATION	FORCE SHOWN ON SCALES
18"	10 feet / second	2 Pounds
18"	20 feet/second	8 Pounds
36"	10 feet/ second	1 Pound
36"	20 feet/second	4 Pounds

According to the results shown in the table, mark each of the following statements True, False, or Not Proved in the space provided.

1) The centripetal force produced is directly proportional to the mass or weight of the object. ______

2) The centripetal force produced is inversely proportional to the distance of the object from the center. ______

3) The centripetal force produced is equal to the gravitational force on the string. ______

4) The centripetal force produced is inversely proportional to the square of the speed with which the object is moving. ______

Answer: 1) Not Proved 2) True 3) Not Proved 4) False

Objective 221 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Applications, Problem Solving

SUB-CATEGORY: Number Puzzles

OBJECTIVE: Given number puzzles which can be solved by simple linear equations, the student will solve each at least 4 ways using 4 different numbers for the variable, one of which must be n.

SAMPLE ITEM:

Solve using 4 different numbers, one of which must be n.

1. Start with any number.
2. Add the next larger number.
3. Add 9 to this sum.
4. Divide the result by 2.
5. Subtract the original number.
6. Give answer (answer is always 5)

Answer:

Solution #1

12
$12 + 13 = 25$
$25 + 9 = 34$
$\frac{34}{2} = 17$
$17 - 12 = 5$

Solution #2

100
$100 + 101 = 201$
$201 + 9 = 210$
$\frac{210}{2} = 105$
$105 - 100 = 5$

Solution #3

-4
$-4 + (-3) = -7$
$-7 + 9 = 2$
$\frac{2}{2} = 1$
$1 - (-4) = 5$

Solution #4

n
$n + (n + 1) = 2n + 1$
$2n + 1 + 9 = 2n + 10$
$\frac{2n + 10}{2} = n + 5$
$n + 5 - n = 5$

ITEM 1

Objective 222

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Applications, Problem Solving

SUB-CATEGORY: Statistics

OBJECTIVE: Given a situation in which faulty conclusions are presented, the student will analyze the data and identify the errors in logic.

SAMPLE ITEMS:

What is wrong with the conclusions based on the data given in the following problem?

More people were killed in airplane accidents in 1969 than 1929. Therefore, it was safer to ride in an airplane in 1929.

Answer: Less planes in 1929

ITEM 1

What is wrong with the conclusions based on the data given in the following problem?

Everybody who used Sneezo got over his cold in 8 days. Therefore, Sneezo is a cure for colds.

Answer: Most people get over colds in 8 days without Sneezo.

ITEM 2

What is wrong with the conclusions based on the data given in the following problem?

Purple cows produced 22% more milk than other cows last year. Therefore, they are the best milkers.

Answer: Perhaps purple cows received special food and treatment.

ITEM 3

Objective 223 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Applications, Problem Solving

SUB-CATEGORY: Problem Solving With a Partner

OBJECTIVE: Given a verbally stated problem, the student will select a partner and solve each problem by discussion, coming to a common agreement upon the solution with his partner.

SAMPLE ITEMS:

Select a partner and solve the following problem.

Bill Jones wanted Sally Smith's phone number. To tease him, Sally said that ninety added to her age equalled 6 times her phone number minus 6060. Bill knew Sally was 18 years old. Find Sally's phone number for Bill.

Answer: 1028 or 6078

ITEM 1

Select a partner and solve the following problem.

The head of a fish is 10 inches long; the tail is as long as the head plus ½ of the body; the body is as long as the head and tail together. How long is the fish?

Answer: 80"

ITEM 2

Select a partner and solve the following problem.

The sum of the ages of a father and his son is 40. In five years the father will be 4 times as old as the son. How old is each now?

Answer: Father, 35; Son, 5

ITEM 3

Objective 224 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Applications, Problem Solving

SUB-CATEGORY: Applications of Per Cent

OBJECTIVE:	Given a verbally stated problem involving per cent, the student will solve for the requested information.

SAMPLE ITEMS:

Solve for the requested information.

Ralph was paid $120 a week when he began working in a service station. After six months his wages were increased to $150 a week. What is the per cent of increase?

Answer: 25%

ITEM 1

Solve for the requested information.

At the beginning of summer vacation Robin weighed 100 pounds. When he returned to school, his weight had increased to 112 pounds. To the nearest tenth, what was the per cent of increase?

Answer: 12%

ITEM 2

Solve for the requested information.

The weight of a bar of aluminum is 63% of the weight of a bar of iron of the same size. If a bar of aluminum weighs 1310.4 pounds, what would a bar of iron of the same size weigh?

Answer: 2080 pounds

ITEM 3

Objective 225 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Applications, Problem Solving

SUB-CATEGORY: Applications of Commutative, Associative, and Distributive Properties

OBJECTIVE: Given a verbally stated problem which can be solved easily by applications of the commutative, associative, and distributive properties, the student will name the property used and solve the problem.

SAMPLE ITEMS:

Apply the commutative, associative, or distributive properties to the following problem. Tell which property you used and solve the problem.

The laboratory assistant is taking an inventory. He counted thirty-seven boxes of test tubes. Each box contains four dozen test tubes. How many test tubes are there in all?

Answer: Distributive $37 \times (40 + 8) = (37 \times 40) + (37 \times 8)$

$1776 = 1776$

ITEM 1

Apply the commutative, associative, or distributive properties to the following problem. Tell which property you used and solve the problem.

Each box of microscope slides contains a gross (144). There are six boxes in the store room and five boxes in the laboratory. How many slides are there altogether?

Answer: Distributive $144 \times (10 + 1) = (144 \times 10) + (144 \times 1)$

$1584 = 1584$

ITEM 2

Apply the commutative, associative, or distributive properties to the following problem. Tell which property you used and solve the problem.

A case of machine bolts contains twelve boxes. Each box contains one hundred bolts. If a hardware store has seven cases of machine bolts, how many bolts does it have?

Answer: Associative $(7 \times 12) \times 100 = 7 \times (12 \times 100)$

$425 = 425$

ITEM 3

Objective 226 Math

IOX Acceptability Rating: 1 Grade 7-9

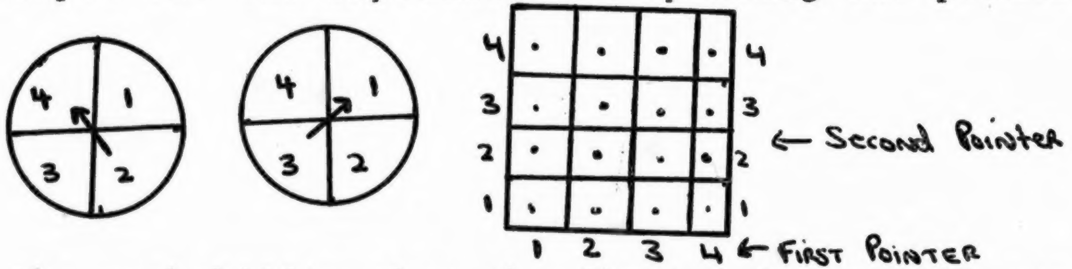
MAJOR CATEGORY: Applications, Problem Solving

SUB-CATEGORY: Probability

OBJECTIVE: Given an exercise representing applications of probability theory, the student will answer questions about the exercise.

SAMPLE ITEMS:

Here is a sample for the experiment of spinning two pointers.



1. What is the probability that the first pointer will stop on 3 and the second on 2?

2. What is the probability that both pointers will stop on numbers larger than 2?

3. What is the probability that the sum of the numbers indicated by the pointers will be 6?

4. What sum are you likely to get more than any other? What is the probability of getting this sum?

Answer: 1. $\frac{1}{16}$

2. $\frac{1}{4}$

3. $\frac{3}{16}$

4. 5, $\frac{1}{4}$

ITEM 1

Objective 227 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Applications, Problem Solving

SUB-CATEGORY: Applying Number Sentences In One Variable

OBJECTIVE: Given a verbally stated problem, the student will write a numerical sentence and a solution to the problem.

SAMPLE ITEMS:

Write a numerical sentence for the following problem and find the solution.

The sum of 2 numbers is 49. One of the numbers is seven less than the other. Find the numbers.

Answer: $n + (n + 7) = 49$; $n = 21$, $n + 7 = 28$

ITEM 1

Write a numerical sentence for the following problem and find the solution.

The sum of 2 numbers is 35. Twice the smaller is equal to 5 more than half the larger. What are the numbers? Let y be the larger and 35 - y be the smaller.

Answer: $2(35 - y) = \frac{1}{2}y + 5$; $y = 26$, $35 - y = 9$

ITEM 2

Write a numerical sentence for the following problem and find the solution.

In 3 years Jumbo will be twice as old as Mumbo. Jumbo is now 5 years older than Mumbo. How old is Mumbo now?

Answer: $(x + 5) + 3 = 2(x + 3)$; Mumbo is now 2 years old.

ITEM 3

Write a numerical sentence for the following problem and find the solution.

The sum of 3 consecutive integers is 33. Find the largest of these integers.

Answer: $y + (y - 1) + (y - 2) = 33$; $y = 12$
(y = largest integer)

ITEM 4

Objective 228 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Applications, Problem Solving

SUB-CATEGORY: Other Base Systems

OBJECTIVE: Given a verbally stated problem involving numerals in other bases, the student will solve the problem.

SAMPLE ITEMS:

Solve the following problem. For a cookout, Mrs. Green bought 30_{twelve} ears of corn at 60¢ a dozen. How much did the corn cost? Answer: $1.80 ITEM 1	Solve the following problem by answering true or false. April has 42_{seven} days. Answer: True ITEM 2
Solve the following problem by answering true or false. A person cannot vote until he is $\text{TE}_{\text{twelve}}$ years old. Answer: False ITEM 3	Solve the following problem by answering true or false. There are 30_{seven} inches in a yard. Answer: False ITEM 4

Objective 229 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Applications, Problem Solving

SUB-CATEGORY: Deductive Reasoning

OBJECTIVE: Given an exercise involving applications of deductive reasoning, the student will draw conclusions from the given information.

SAMPLE ITEMS:

Draw a conclusion from the given information.

On Sunday you are listening to a ball game. The Mets are playing the Giants in San Francisco. In the last half of the ninth inning, with one man out, someone hit a home run and won the game. Which team won?

Answer: The Giants won.

ITEM 1

Draw a conclusion from the given information.

Suppose we know that no one with gray eyes can be trusted. We notice that Ellen has gray eyes.

Answer: Ellen cannot be trusted.

ITEM 2

Draw a conclusion from the given information.

All misers are selfish. Misers are the only persons who save cracker crumbs. Herman Fink saves cracker crumbs. David Clod does not save cracker crumbs.

Answer: Herman Fink is a miser and therefore selfish. We cannot tell about David Clod.

ITEM 3

Objective 230 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Applications, Problem Solving

SUB-CATEGORY: Logic

OBJECTIVE: Given a verbally stated problem which can be solved by applications of logic, the student will solve the problem.

SAMPLE ITEMS:

Solve the following problem:

Jim said, "I have as many brothers as sisters." His sister said, "I have twice as many brothers as sisters." How many brothers and sisters are in this family?

Answer: 4 brothers, 3 sisters

ITEM 1

Solve the following problem:

If you have 6 coins and one is lighter than the others, find the bad coin in two weighings, using a pan balance scale.

Answer: Weigh 3 coins against 3. One set will be light. Take the light set and weigh any coin against the other. If they balance, the third coin is counterfeit. If they do not balance, the light one can be determined.

ITEM 2

Solve the following problem:

A monkey is at the bottom of a 30' well. Each day he jumps up 3' and slips back 2'. How long will it take him to touch the top of the well?

Answer: 28 days

ITEM 3

Objective 231

IOX Acceptability Rating: 1

Math

Grade 7-9

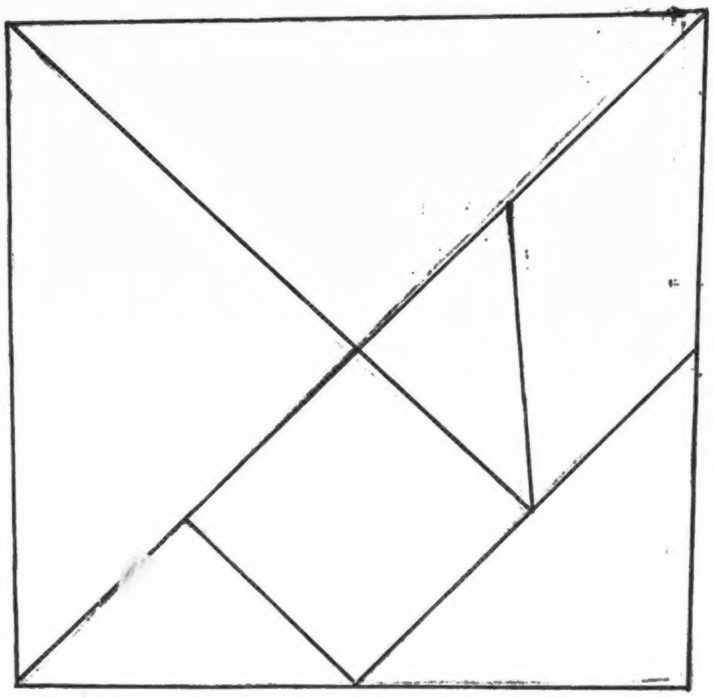
MAJOR CATEGORY: Applications, Problem Solving

SUB-CATEGORY: Geometric Shapes

OBJECTIVE: Given a "Chinese Tangram," a square divided into 5 triangles, a small square and a parallelogram, black paper, scissors, and glue, the student will create an abstract design by arranging the shapes on the paper so that each shape is used.

SAMPLE ITEM:

Cut out these shapes. Arrange them on black paper in an abstract design. Each shape must touch another and all shapes must be used.



Answers will vary

Objective 232 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Applications, Problem

SUB-CATEGORY: Use of Math Resource Area

OBJECTIVE: Given a math resource area with puzzles, games, and selected enrichment materials, the student will voluntarily visit this area a specified number of times.

SAMPLE ITEM:

Does the student visit this area at least 3 times per week? Month? Quarter?

Answer: Evaluation will be by teacher observation.

ITEM 1

Objective 233 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Applications, Problem Solving

SUB-CATEGORY: Steps to Solving a Problem

OBJECTIVE: Given a verbally stated problem and a list of steps useful in solving a verbally stated problem, the student will apply the given steps by listing the important information next to each step.

SAMPLE ITEM:

Apply the following steps to the given problem:

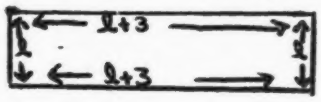
What are the lengths of the sides of a rectangle if one side is 3" longer than an adjacent side and the perimeter is 34"?

A) Decide what unknown number or numbers are asked for.
B) Write number phrases for the unknown number or numbers.
C) Make a sketch that will help you visualize the information.
D) Find some numerical fact in the problem that can be related to the unknown number or numbers.
E) Solve the equation.
F) Check your answer against the conditions stated in the problem

Answer: A) Lengths of the sides.

B) x = length of the shorter side.
$x + 3$ = length of an adjacent side.

C)



D) $x = 34''$ $\quad x + (x + 3) + x + (x + 3) = 34$

E)
$$\begin{aligned} x + x + 3 + x + x + 3 &= 34 \\ 4x + 6 &= 34 \\ 4x + 6 + (-6) &= 34 + (-6) \\ 4x &= 28 \\ x &= 7 \\ x + 3 &= 10 \end{aligned}$$

$7 + 10 + 7 + 10 = 34$

ITEM 1

Objective 234 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Applications, Problem Solving

SUB-CATEGORY: Recognizing Needed Information

OBJECTIVE: Given a verbally stated problem with nonessential information or not enough information, the student will select the necessary information and solve or write "not enough information."

SAMPLE ITEMS:

The following problem may not contain enough information. State "not enough information." The problem may have nonessential information. List the nonessential information and solve.

Students in a 7th grade class sold 180 tickets for the class play. Adult tickets were $1 and student tickets were 50¢. How much did they earn for the class treasury?

Answer: Not enough information

ITEM 1

The following problem may not contain enough information. State "not enough information." The problem may have nonessential information. List the nonessential information and solve.

A car is traveling at 50 mph. It consumes gasoline at the rate of 25 miles per gallon. How long will it take to travel 150 miles?

Answer: Don't need the number of miles the car travels on one gallon of gas. Answer: 3 hours.

ITEM 2

The following problem may not contain enough information. State "not enough information." The problem may have nonessential information. List the nonessential information and solve.

A farmer had 500 bushels of wheat. He sold a wagon load containing 6900 lb. of wheat. How many bushels had he left?

Answer: Not enough information.

ITEM 3

Objective 235 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Applications, Problem Solving

SUB-CATEGORY: Extimating

OBJECTIVE: Given a problem, the student will estimate the answer.

SAMPLE ITEMS:

Estimate the answer to the following. Do not work with pencil and paper.

What are 3452 bushels of corn worth at $1.50 per bushel?

Answer: Approximately $5200

ITEM 1

Estimate the answer to the following. Do not work with pencil and paper.

A satellite is traveling at about 6 mi. per second (mi/sec). About how far will it travel in an hour?

Answer: Approximately 21,600 MPH

ITEM 2

Estimate the answer to the following. Do not work with pencil and paper.

A team played 162 baseball games in a season and lost 20 more than it won. How many games did it win?

Answer: Approximately 70 games won

ITEM 3

Estimate the answer to the following. Do not work with pencil and paper.

What is the product of 987 and 864?

Answer: Approximately 850,000

ITEM 4

Objective 236 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Applications, Problem Solving

SUB-CATEGORY: Avoiding Careless Mistakes

OBJECTIVE: Given a verbally stated problem with an incorrect answer, the student will estimate the correct answer and orally state the possible reasoning used in arriving at the incorrect solution.

SAMPLE ITEMS:

For the problem below an incorrect answer is given. Explain what reasoning might have been used in arriving at the incorrect answer and estimate the correct answer.

How many inches are there in 48'? Answer: 4"

Answer:	Reasoning for Incorrect Answer	Correct Answer
	$48 \div 12 = 4$	$48 \times 12 = 576$

ITEM 1

For the problem below an incorrect answer is given. Explain what reasoning might have been used in arriving at the incorrect answer and estimate the correct answer.

A tank can be filled in 15 minutes by pumping water through one pipe. A drain pipe makes it possible to empty the tank in 10 minutes. The tank is full of water and the drain pipe is opened at the same moment at which the pump for filling the tank is turned on. How long will it take the tank to empty?
Answer: 5 minutes

Answer:	Reasoning for Incorrect Answer	Correct Answer
	$15 - 10 = 5$	t = time to drain $\frac{1}{10}t - \frac{1}{15}t = 1$ t = 30 minutes

ITEM 2

Objective 237 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Applications, Problem Solving

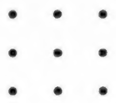
SUB-CATEGORY: Divergent Thinking

OBJECTIVE: Given a geometric figure similar to items used to test for divergent thinking on creativity inventories, the student will give evidence of divergent thinking by completing the exercise according to the given conditions.

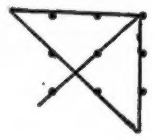
SAMPLE ITEMS:

Complete the following.

Place your pencil on one dot and, without lifting your pencil from the paper, draw 4 straight line segments so that each dot lies on one of the segments.



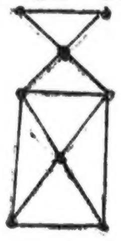
Answer:



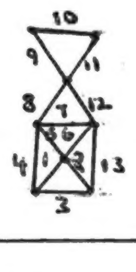
ITEM 1

Complete the following.

Trace the figure without lifting your pencil from the paper or retracing any line segment. Begin at one of the 8 points.



Answer: Other solutions are possible.



ITEM 2

Objective 238

IOX Acceptability Rating: 1

Math

Grade 7-9

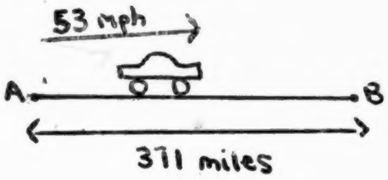
MAJOR CATEGORY: Applications, Problem Solving

SUB-CATEGORY: Wordless Problems

OBJECTIVE: Given a sketch or a diagram of a problem with the necessary numbers, the student will write and solve the problem.

SAMPLE ITEMS:

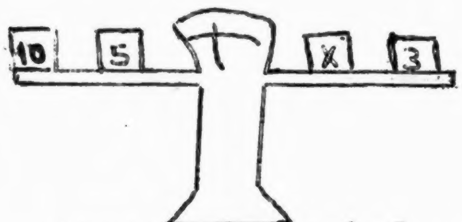
The diagram below should suggest a problem. Write and solve your own problem for the diagram.



Answer: (verbal statements will vary). It will take 7 hrs. to travel 371 miles.

ITEM 1

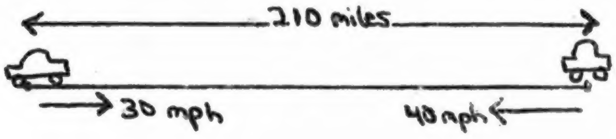
The sketch below should suggest a problem. Write and solve your own problem for the sketch.



Answer: (verbal statements will vary). Weight x equals 12 units.

ITEM 2

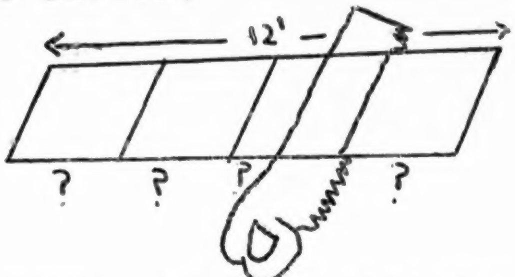
The diagram below should suggest a problem. Write and solve your own problem for the diagram.



Answer: (verbal statements will vary). The two cars will meet in 3 hrs.

ITEM 3

The sketch below should suggest a problem. Write and solve your own problem for the sketch.



Answer: (verbal statements will vary). Each piece is 3' long.

ITEM 4

Objective 239 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Applications, Problem Solving

SUB-CATEGORY: Square Root

OBJECTIVE: Given a verbal problem involving square root, the student will solve the problem correct to the nearest tenth.

SAMPLE ITEMS:

Solve the following problem correct to the nearest tenth: What is the measure of the longest line that can be drawn on an 8" x 11" piece of paper? Answer: 13.6" ITEM 1	Solve the following problem correct to the nearest tenth: If the boat "Moonshot" heads north at 25 MPH while the boat "Rocket" heads east at 20 MPH, how far apart will the ships be after 3 hours? Answer: 96.0 miles ITEM 2
Solve the following problem correct to the nearest tenth: A checkerboard has 8 two inch squares on each side. How far is it from one corner of the board to the opposite corner? Answer: 22.6" ITEM 3	Solve the following problem correct to the nearest tenth: The distance on a baseball field from home plate to first base is 90 feet, and the 4 bases are vertices of a square. How far does the first baseman have to be able to throw to reach third base? Answer: 127.2' ITEM 4

Objective 240

Math

IOX Acceptability Rating: 1

Grade 7-9

MAJOR CATEGORY: Applications, Problem Solving

SUB-CATEGORY: Statistics

OBJECTIVE: Given a situation in which a faulty conclusion is presented, the student will analyze the data and identify the errors in logic.

SAMPLE ITEMS:

What is wrong with the conclusion based on the given data?

More people were killed in airplane accidents in 1969 than in 1929. Therefore, it was safer to ride in an airplane in 1929.

Answer: There were less planes in 1929 and far less people flew in planes. It is better to talk about the percentage of deaths in relation to the number of passenger air miles flown in these two years.

ITEM 1

What is wrong with the conclusion based on the given data?

Thirty years ago it took an adult to carry $10.00 worth of groceries. Today a child can do it. Therefore children are stronger than they were in the past.

Answer: $10.00 does not buy as much as it used to. A child still could not carry the $10.00 bag of groceries of thirty years ago.

ITEM 2

Objective 241

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Mathematical Sentences, Order, Logic

SUB-CATEGORY: Graphing--Inequalities in one Variable

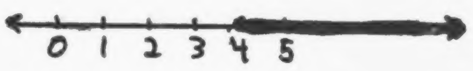
OBJECTIVE: Given a set whose rule for finding its members is an inequality and R (real numbers) as the replacement set, the student will graph the given set.

SAMPLE ITEM:

Graph the following set if the replacement set for X is the set R (real numbers):

$\{X:\ X \geq 4\}$

Answer:

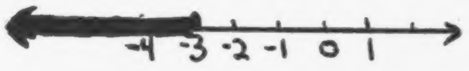


ITEM 1

Graph the following set if the replacement set for X is the set R (real numbers):

$\{X:\ X < -3\}$

Answer:

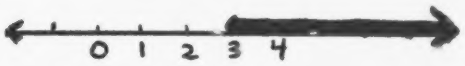


ITEM 2

Graph the following set if the replacement set for X is the set R (real numbers):

$\{X:\ X + 1 > 4\}$

Answer:

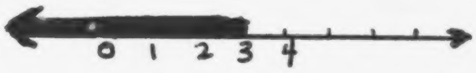


ITEM 3

Graph the following set if the replacement set for X is the set R (real numbers):

$\{X:\ X + 4 \leq 7\}$

Answer:



ITEM 4

Objective 242 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Mathematical Sentences, Order, Logic

SUB-CATEGORY: Solving Inequalities in one Variable

OBJECTIVE: Given an inequality, the student will find the solution set over R (real numbers).

SAMPLE ITEMS:

Specify the solution set over R (real numbers) for the following inequality.

$X - 1 > 9$

Answer: $\{X: X > 10\}$

ITEM 1

Specify the solution set over R (real numbers) for the following inequality.

$X + 1 \geq -8$

Answer: $\{X: X \geq -9\}$

ITEM 2

Specify the solution set over R (real numbers) for the following inequality.

$X + 4 < 7$

Answer: $\{X: X < 3\}$

ITEM 3

Specify the solution set over R (real numbers) for the following inequality.

$X + 3 \leq -5$

Answer: $\{X: X \leq -8\}$

ITEM 4

Objective 243 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Mathematical Sentences, Order, Logic

SUB-CATEGORY: Compound Inequalities

OBJECTIVE: Given a verbal description and a set of mathematical descriptions of compound inequalities, the student will select the appropriate mathematical description for the problem.

SAMPLE ITEM:

To qualify for membership in the Moon Explorers' Club, a boy must be at least 12 years old and at most 14 years old. Complete the following questions using X to represent a boy's age in years.

1) Which of the following are mathematical descriptions of the age requirement for members?

a) $X \geq 12$ b) $X \leq 14$ c) $X \geq 12$ or $X \leq 14$

d) $X \geq 12$ and $X \leq 14$

2) Which of the following describes the set of permissible ages?

a) $\{X: X \geq 12\} \cup \{X: X \leq 14\}$

b) $\{X: X \geq 12\} \cap \{X: X \leq 14\}$

Answer: 1. d

2. b

ITEM 1

Objective 244
IOX Acceptability Rating: 1

Math
Grade 7-9

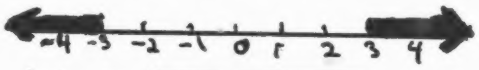
MAJOR CATEGORY: Mathematical Sentences, Order, Logic
SUB-CATEGORY: Graphing Compound Inequalities

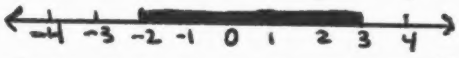
OBJECTIVE: Given a set of compound inequalities and a set of graphs, the student will match the inequality with the appropriate graph.

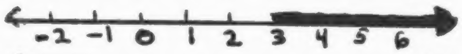
SAMPLE ITEM:

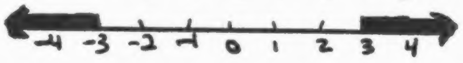
Match each of the following compound inequalities with the appropriate graph:

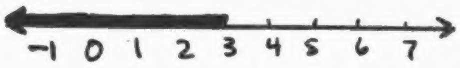
A) $\{X:X > 6 \text{ and } X > 3\}$
B) $\{X:X > 3 \text{ or } X < -3\}$
C) $\{X:X \leq 3 \text{ or } X < 0\}$
D) $\{X:X < 3 \text{ and } X \geq -2\}$
E) $\{X:X > 3 \text{ or } X \leq -3\}$

1) 

2) 

3) 

4) 

5) 

Answer:
A---3
B---1
C---5
D---2
E---4

ITEM 1

Objective 245 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Mathematical Sentences, Order, Logic

SUB-CATEGORY: Compound Inequalities--True, False

OBJECTIVE: Given a compound inequality, the student will label the inequality as true or false.

SAMPLE ITEMS:

Label the given compound inequality as true (T) or false (F).

$0 > -2$ or $-2 > -1$

Answer: True (T)

ITEM 1

Label the given compound inequality as true (T) or false (F).

$3 + 9 = 12$ or $4 + 11 < 15$

Answer: True (T)

ITEM 2

Label the given compound inequality as true (T) or false (F).

$9 + (-3) = 6$ and $-3 < -5$

Answer: False (F)

ITEM 3

Label the given compound inequality as true (T) or false (F).

$4 - (-3) > 6$ and $2 + (-6) < -5$

Answer: False (F)

ITEM 4

Objective 246

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Mathematical Sentences, Order, Logic

SUB-CATEGORY: Solving Compound Inequalities

OBJECTIVE: Given a compound inequality over the set of real numbers, the student will solve to find the solution set.

SAMPLE ITEMS:

Use set-builder notation to write the solution set of the following over R (the real numbers).

$\{X:X \leq -4\} \cap \{X:X > -4\}$

Answer: $\{3 \text{ or } \emptyset\}$

ITEM 1

Use set-builder notation to write the solution set of the following over R (the real numbers).

$\{X:X > 3\} \cap \{X:X < 7\}$

Answer: $\{X:3 < X < 7\}$

ITEM 2

Use set-builder notation to write the solution set of the following over R (the real numbers).

$\{X:X < 3\} \cup \{X:X < 0\}$

Answer: $\{X:X < 3\}$

ITEM 3

Use set-builder notation to write the solution set of the following over R (the real numbers).

$\{X:-2 < X < 2\} \cap \{X:X < 0\}$

Answer: $\{X:-2 < X < 0\}$

ITEM 4

Objective 247 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Mathematical Sentences, Order, Logic

SUB-CATEGORY: Order Symbols, =,<,>

OBJECTIVE: Given at least two numerals, the student will order them using, =,<,>.

SAMPLE ITEM:

Order the following numerals using =,<,>.

a) 2.5 ___ $2\frac{1}{2}$ ___ 2.05
b) -2 ___ 4
c) 3.99 ___ 4.0
d) 0.35 ___ 0.4
e) $\frac{18}{23}$ ___ $\frac{37}{46}$
f) -2 ___ 0
g) $1.7\overline{6}$ ___ 1.761
h) $.6\overline{6}$ ___ $\frac{2}{3}$

Answer:
a) =,>
b) <
c) <
d) <
e) <
f) <
g) >
h) =

ITEM 1

Objective 248 Math
IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Mathematical Sentences, Order, Logic
SUB-CATEGORY: Order--Rational Numbers

OBJECTIVE: Given two rational numbers, the student will find a rational number between them.

SAMPLE ITEMS:

Find a rational number between the given rational numbers.

6.0 and 6.1

Answer: (will vary)
Example----- 6.05

ITEM 1

Find a rational number between the given rational numbers.

-3.35 and -3.36

Answer: (will vary)
Example----- -3.355

ITEM 2

Find a rational number between the given rational numbers.

$\frac{1}{2}$ and .51

Answer: (will vary)
Example------ .505

ITEM 3

Find a rational number between the given rational numbers.

$0.1\overline{9}$ and $0.19\overline{8}$

Answer: (will vary)
Example----- .1989

ITEM 4

Objective 249 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Mathematical Sentences, Order, Logic

SUB-CATEGORY: Logic--Negating Statements

OBJECTIVE: Given a statement, the student will write the negation of the statement.

SAMPLE ITEMS:

Write the negation of the following statement.

Some quadrilaterals are rectangles.

Answer: No quadrilaterals are rectangles.

ITEM 1

Write the negation of the following statement.

All odd numbers are counting numbers.

Answer: Some odd numbers are not counting numbers.

ITEM 2

Write the negation fo the following statement.

All quadrilaterals are polygons.

Answer: There is at least one quadrilateral that is not a polygon.

ITEM 3

Write the negation of the following statement.

Some quadrilaterals are rectangles.

Answer: No quadrilaterals are rectangles.

ITEM 4

Objective 250 Math

IOX Acceptability Rating: 1 Grade 7-9

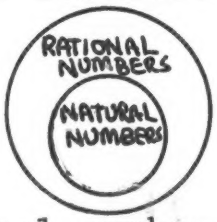
MAJOR CATEGORY: Mathematical Sentences, Order, Logic

SUB-CATEGORY: Logic: Quantifiers: All, Some, No, etc.

OBJECTIVE: Given a diagram and an incomplete sentence related to the diagram, the student will write a quantifier to complete the sentence.

SAMPLE ITEMS:

Study the diagram, then write the word all, some or no to complete the sentence.

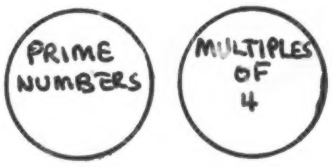

RATIONAL NUMBERS
NATURAL NUMBERS

_____ rational numbers are natural numbers.

Answer: Some

ITEM 1

Study the diagram, then write the word all, some or no to complete the sentence.

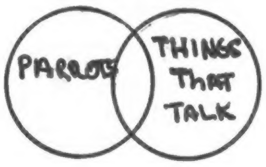

PRIME NUMBERS
MULTIPLES OF 4

_____ prime numbers are multiples of 4.

Answer: No

ITEM 2

Study the diagram, then write the word all, some or no to complete the sentence.

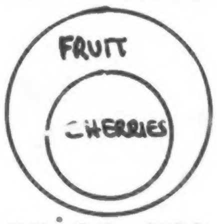

PARROTS
THINGS THAT TALK

_____ parrots talk.

Answer: Some

ITEM 3

Study the diagram, then write the word all, some or no to complete the sentence.


FRUIT
CHERRIES

_____ cherries are fruit.

Answer: All

ITEM 4

Objective 251

IOX Acceptability Rating: 1

Math

Grade 7-9

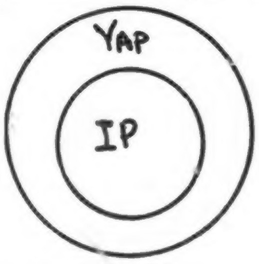
MAJOR CATEGORY: Mathematical Sentences, Order, Logic

SUB-CATEGORY: Logic: If-Then Statements and Quantifiers

OBJECTIVE: Given a diagram and related if-then statements or statements with quantifiers, the student will label the statement as true or false.

SAMPLE ITEMS:

Using the diagram, write true or false on the line to the right of each statement.



1. All IPS are YAPS. ______
2. If it is a YAP, then it is an IP. ______
3. If it is an IP, then it is a YAP. ______

Answer:
1. True
2. False
3. True

ITEM 1

Objective 252 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Mathematical Sentences, Order, Logic

SUB-CATEGORY: Logic: Symbols for Quantifiers

OBJECTIVE: Given a number sentence with one variable, the student will use the symbol $\forall_N$ or $\exists_N$ to make the sentence true.

SAMPLE ITEMS:

Use the symbol $\forall_N$ or $\exists_N$ to make the number sentence true.

$$N - 3 = 0$$

Answer: $\exists_N$

ITEM 1

Use the symbol $\forall_N$ or $\exists_N$ to make the number sentence true.

$$N > 3$$

Answer: $\exists_N$

ITEM 2

Use the symbol $\forall_N$ or $\exists_N$ to make the number sentence true.

$$(4 + N) + 2 = 4 + (N + 2)$$

Answer: $\forall_N$

ITEM 3

Use the symbol $\forall_N$ or $\exists_N$ to make the number sentence true.

$$3(N + 2) = 3N + 6$$

Answer: $\forall_N$

ITEM 4

Objective 253 | Math

IOX Acceptability Rating: 1 | Grade 7-9

MAJOR CATEGORY: Mathematical Sentences, Order, Logic

SUB-CATEGORY: Logic, Symbols--Closure Properties for +, -, x, ÷.

OBJECTIVE: Given a replacement set and a number sentence with the symbols, $\forall_x \forall_y$, and an indicated operation with 2 variables, the student will select those sentences which are true.

SAMPLE ITEM:

Given R = {1,2,3,4,5,6,7} as a replacement set for X and Y, place a check on the line at the left of each true statement.

1. $\forall_x \forall_y$, X + Y is a whole number.
2. $\forall_x \forall_y$, X - Y is a whole number.
3. $\forall_x \forall_y$, XY is a whole number.
4. $\forall_x \forall_y$, X ÷ Y is a whole number.
5. $\forall_x \forall_y$, X + Y is a positive number.
6. $\forall_x \forall_y$, X - Y is a positive number.

Answer:
1. ✓
2.
3. ✓
4.
5. ✓
6.

ITEM 1

Objective 254 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Mathematical Sentences, Order, Logic

SUB-CATEGORY: Logic: If Not-Then Mathematical Sentences

OBJECTIVE: Given an "if not-then" sentence which includes at least two limiting statements, the student will find the solution set.

SAMPLE ITEMS:

Find the solution set of the following. The set of whole numbers between 10 and 20 such that each member is neither even nor prime. Answer: {15} ITEM 1	Find the solution set of the following. The set of whole numbers between 40 and 50 such that each member is neither odd nor a multiple of 3 or 4. Answer: {46} ITEM 2
Find the solution set of the following. The set of factors of 42, other than 1, that are not even numbers or a multiple of 7. Answer: {3} ITEM 3	Find the solution set of the following. The set of whole numbers between 20 and 30 such that each member is neither odd nor divisible by 3, 4, or 11. Answer: {26} ITEM 4

Objectqve 255

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Mathematical Sentences, Order, Logic

SUB-CATEGORY: Evaluating Open Number Phrases

OBJECTIVE: Given the value of the variable and a series of open number phrases, the student will evaluate each phrase.

SAMPLE ITEMS:

Evaluate the phrase when the value of N is 2. $-(N^2)$ Answer: -4 ITEM 1	Evaluate the phrase when the value of N is 2. $N - 3 + (-N)$ Answer: -3 ITEM 2
Evaluate the phrase when the value of N is 2. $\frac{1}{N}(N + 4)$ Answer: 3 ITEM 3	Evaluate the phrase when the value of N is 2. $\frac{-8}{N}$ Answer: -4 ITEM 4

Objective 256 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Mathematical Sentences, Order, Logic

SUB-CATEGORY: Open Number Phrases

OBJECTIVE: Given a verbal phrase, the student will write an open number phrase for the given word phrase.

SAMPLE ITEMS:

Write an open number phrase for the given word phrase. The quotient when N is divided by 3. Answer: $\frac{N}{3}$ ITEM 1	Write an open number phrase for the given word phrase. The sum of L and -0.5. Answer: L + (-0.5) ITEM 2
Write an open number phrase for the given word phrase 13 less than Y Answer: Y - 13 ITEM 3	Write an open number phrase for the given word phrase. 7 less than twice X Answer: 2X - 7 ITEM 4

Objective 257 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Mathematical Sentences, Order, Logic

SUB-CATEGORY: Open Number Sentences and Solutions

> OBJECTIVE: Given an open number sentence and a solution, the student will state whether the given solution is a truth set.

SAMPLE ITEMS:

State whether the given value for X is a solution of the open sentence given. $5X + 4 = X - 6$; $X = 10$ Answer: Not a solution ITEM 1	State whether the given value for X is a solution of the open sentence given. $\frac{3X + 2}{4} \leq 8$; $X = 6$ Answer: Solution ITEM 2
State whether the given value for X is a solution of the open sentence given. $9 - X = 13$; $X = 4$ Answer: Not a solution ITEM 3	State whether the given value for X is a solution of the open sentence given. $-6 - X > -7$; $X = 1$ Answer: Not a solution ITEM 4

Objective 258 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Mathematical Sentences, Order, Logic

SUB-CATEGORY: Solving Equations by Inspection

OBJECTIVE: Given an equation, the student will solve by inspection over the set of real numbers.

SAMPLE ITEM:

By inspection solve over the set of real numbers. $-7 + C = -16$ Answer: $\{-9\}$ ITEM 1	By inspection solve over the set of real numbers. $(35)(N) = (7)(5)$ Answer: $\{1\}$ ITEM 2
By inspection solve over the set of real numbers. $\frac{29X}{3} = \frac{2}{3}(29)$ Answer: $\{2\}$ ITEM 3	By inspection solve over the set of real numbers. $-4 + Y = -12 + (-4)$ Answer: $\{-12\}$ ITEM 4

Objective 259 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Mathematical Sentences, Order, Logic

SUB-CATEGORY: Logic--Short Story Problems

OBJECTIVE: Given a short story problem, the student will read the problem, write a suitable number sentence and solve it.

SAMPLE ITEMS:

Write a number sentence and solve the following "short story."

495 students. 9 school buses. Same number of students in each bus. How many students in each bus?

Answer: $495 \div 9 = 55$

ITEM 1

Write a number sentence and solve the following "short story."

Strawberries at \$10.80 a crate. 24 boxes in a crate. How much for one box?

Answer: \$10.80 ÷ 24 = 45¢

ITEM 2

Write a number sentence and solve the following "short story."

Trip: 486 miles. Time: 9 hours. What was the average speed in miles per hour?

Answer: 486 miles ÷ 9 hrs = 54 mph.

ITEM 3

Write a number sentence and solve the following "short story."

Bus tokens 20¢ a piece. 3 dozen in a set. How much for a set?

Answer: 20¢ x 36 = \$7.20

ITEM 4

Objective 260

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Mathematical Sentences, Order, Logic

SUB-CATEGORY: Mathematical Symbols

OBJECTIVE: Given a set of mathematical symbols used to indicate sets of points, the student will write the meaning of each symbol in words.

SAMPLE ITEM:

Write the meaning of each of the following symbols.

1. $\angle, \angle s$
2. $\triangle, \triangle s$
3. $\overleftrightarrow{AB}$
4. $\overline{AB}$
5. $\overset{\circ\!\!-\!\!-\!\!-}{AB}$
6. $\overset{-\!\!-\!\!-\!\!\circ}{AB}$
7. $\overset{\circ\!\!-\!\!-\!\!\circ}{AB}$
8. $\overrightarrow{AB}$
9. $\overset{\circ\!\!\longrightarrow}{AB}$
10. $\cong$
11. $\sim$

Answer:
1. Angle, angles
2. Triangle, triangles
3. Line AB
4. Line Segment AB
5. Open Line Segment AB, open at point A
6. Open Line Segment AB, open at point B
7. Open Line Segment AB, open at points A and B
8. Ray AB
9. Open ray AB or half line AB
10. Is congruent to
11. Is similar to

ITEM 1

Objective 261

Math

IOX Acceptability Rating: 1

Grade 7-9

MAJOR CATEGORY: Mathematical Sentences, Order, Logic

SUB-CATEGORY: Mathematical Symbols

OBJECTIVE: Given a set of mathematical symbols used to indicate the relationship between two numerals, the student will write the meaning of each symbol in words and use each symbol in a mathematical sentence.

SAMPLE ITEM:

Write the meaning of each of the following symbols and use each symbol in a mathematical sentence.

1. $=$
2. $\neq$
3. $>$
4. $<$
5. $\ngtr$
6. $\nless$
7. $\geq$
8. $\leq$
9. $\ngeq$
10. $\nleq$
11. $\doteq$

Answer: (answers will vary)

1. is equal to $3 + 4 = 7$
2. is not equal to $3 + 4 \neq 9$
3. is greater than $3 > 2$
4. is less than $3 < 8$
5. is not greater than $3 \ngtr 3$
6. is not less than $3 \nless 3$
7. is greater than or equal to $x \geq 3$
8. is less than or equal to $x \leq 4$
9. is not greater than or equal to $x \ngeq 8$, $x < 8$
10. is not less than or equal to $x \nleq 3$, $x > 3$
11. is approximately equal to $\pi \doteq 3.14$

ITEM 1

Objective 262 | Math

IOX Acceptability Rating: 1 | Grade 7-9

MAJOR CATEGORY: Mathematical Sentences, Order, Logic

SUB-CATEGORY: Mathematical Symbols

OBJECTIVE: Given a set of mathematical symbols, the student will write the meaning of each symbol in words and will use each symbol in a mathematical sentence.

SAMPLE ITEM:

Write the meaning of the following symbols and use each in a mathematical sentence.

1. $|N|$
2. π
3. $\parallel$
4. $\perp$
5. $\sqrt{\ }$
6. $\{x: \ \}$
7. $m = \frac{\Delta y}{\Delta x}$
8. $\Rightarrow$
9. (x,y)
10. $(\ ), [\ ], \{\ \}$

Answer:

1.	Absolute value	$\|-3\| = 3$
2.	Quotient of circumference of circle and diameter, Pi.	$C = \pi d$
3.	Is parallel to	$\overline{AB} \parallel \overline{CD}$
4.	Is perpendicular to	$\overleftrightarrow{AB} \perp \overleftrightarrow{CD}$
5.	Square root of a number	$\sqrt{16} = 4$
6.	Set builder notation	$\{X:X + 3 = Y\}$
7.	Slope of a line, change in vertical distance ÷ change in horizontal distance	$M = \frac{-3-3}{3-1} = -3$
8.	First part implies second part	$3=1+2,\ 1+2=5-2 \Rightarrow 3=5-2$
9.	Ordered pair notation	$(3,4)$
10.	Grouping symbols--parentheses. brackets, braces.	$X=2\{3[5-(4+2)]\}$

ITEM 1

Objective 263

IOX Acceptability Rating: 1

Math

Grade 7-9

MAJOR CATEGORY: Mathematical Sentences, Order, Logic

SUB-CATEGORY: Equivalent Equations

OBJECTIVE: Given three equations, two of which are equivalent, the student will select the two equivalent equations.

SAMPLE ITEMS:

Using as your replacement set the whole numbers less than 10, write the letters (a,b,c) of the pair of equivalent equations.

a. $Y + 2 = 0$
b. $Y + 1 = -1$
c. $Y + 1 + 1$

Answer: a,b

ITEM 1

Using as your replacement set the whole numbers less than 10, write the letters (a,b,c) of the pair of equivalent equations.

a. $X - 1 = 9$
b. $2X = 10$
c. $2X - 2 = 8$

Answer: b,c

ITEM 2

Using as your replacement set the whole numbers less than 10, write the letters (a,b,c) of the pair of equivalent equations.

a. $2K > 8$
b. $2K > 14$
c. $2K + 3 > 11$

Answer: a,c

ITEM 3

Using as your replacement set the whole numbers less than 10, write the letters (a,b,c) of the pair of equivalent equations.

a. $2M < 22$
b. $M < 7$
c. $2M + 4 < 18$

Answer: b,c

ITEM 4

Objective 264
IOX Acceptability Rating: 1

Math
Grade 7-9

MAJOR CATEGORY: Mathematical Sentences, Order, Logic
SUB-CATEGORY: Logic--Negations

OBJECTIVE: Given a set of statements and a set of their negations, the student will match each statement with its negative.

SAMPLE ITEM:

Pair each statement on the right with its negative on the left.

1. No parallel lines intersect.
2. Some cars are red.
3. No boys wear hats.
4. All cubes have 6 faces.
5. All numbers divisible by 9 are divisible by 3.
6. All cars have tires.

A. There is at least 1 boy who wears a hat.
B. There is at least 1 cube that does not have 6 faces.
C. There is at least 1 car that does not have tires.
D. Some parallel lines intersect.
E. Some numbers that are divisible by 9 are not divisible by 3.
F. No cars are red.
G. One car is red.
H. One cube has 6 faces.

Answer: 1.D
2.F
3.A
4.B
5.E
6.C

ITEM 1

Objective 265 Math

IOX Acceptability Rating: 1 Grade 7-9

MAJOR CATEGORY: Mathematical Sentences, Order, Logic

SUB-CATEGORY: Solving Equations With Two Solutions

OBJECTIVE: Given an equation which has two solutions over the set of real numbers, the student will transform the equation and solve to find the two solutions.

SAMPLE ITEMS:

The following equation has two solutions over the set of real numbers. Transform the equation until you can solve one of the resulting equations by inspection. Find the two solutions.

$$x^2 + 2 = 11$$

Answer: $x^2 + 2 = 11$

$x^2 + 2 - 2 = 11 - 2$

$x^2 = 9$

$x = 3, -3$

ITEM 1

The following equation has two solutions over the set of real numbers. Transform the equation until you can solve one of the resulting equations by inspection. Find the two solutions.

$$-3 = y^2 - 19$$

Answer: $-3 = y^2 - 19$

$y^2 - 19 + 19 = -3 + 19$

$y^2 = 16$

$y = 4, -4$

ITEM 2

PROBE Guiding Committee

Marvin C. Alkin — Director, Center for the Study of Evaluation; Associate Professor, Graduate School of Education, UCLA.

Eva L. Baker — Assistant Professor, Graduate School of Education, UCLA.

Madeline Hunter — Principal, University Elementary School, UCLA.

Ronald G. McIntire — Executive Officer, Project for Research on Objective Based Evaluation (PROBE).

W. James Popham — Associate Professor, Graduate School of Education, UCLA.

Rodney W. Skager — Associate Professor, Graduate School of Education, UCLA.